THE SIZE OF NON-OBSERVED ECONOMIC ACTIVITIES OF SOUTH AFRICA BY SECTOR FOR 2011 AND 2016: AN APPLICATION OF 2008 SYSTEM OF NATIONAL ACCOUNTS PRINCIPLES TO ENSURE A MORE COMPLETE ESTIMATE OF THE VALUE ADDED OF ECONOMIC ACTIVITIES IN SOUTH AFRICA

By

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ABSTRACT

This research focuses on the measurement of the non-observed economic activities by sector of South Africa for the 2011 and 2016 calendar years. The purpose of the research is to determine whether the current GDP as estimated by Statistics South Africa is under- or overestimated when considering the non-observed economy. The research is based on the 2008 System of National Accounts as it determines the guidelines, definitions and characteristics of the "Non-observed economy (NOE)" sector and it allows national accountants to use/supplement the research in the estimates of the GDP. This research follows a quantitative methodology where several surveys of Statistics South Africa are used. Where lack of data exists, some administrative data is used regarding the illegal activities. The findings of the research is that the total economy of South Africa is underestimated when taking into account the NOE activities.

Title of thesis/dissertation:

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KEY TERMS

Size of non-observed economy activities, informal activities, illegal activities, South Africa, characteristics of non-observed activities, measuring the non-observed economy activities, Standard Industrial classification, sectors/industries in South Africa, 2008 System of National Accounts, National accounts.

DECLARATION

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Exact wording of the title of the dissertation as appearing on the electronic copy submitted for examination: The size of non-observed economic activities of South Africa by sector for 2011 and 2016: An application of 2008 System of National Accounts principles to ensure a more complete estimate of the value added of economic activities in South Africa

I declare that the above dissertation is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

I further declare that I submitted the dissertation to originality checking software and that it falls within the accepted requirements for originality.

I further declare that I have not previously submitted this work, or part of it, for examination at Unisa for another qualification or at any other higher education institution.

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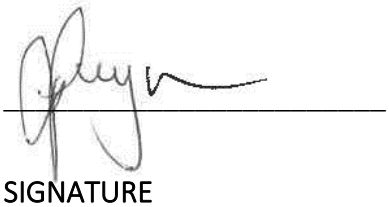

SIGNATURE

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LIST OF ABBREVIATIONS

1968 SNA	System of National Accounts 1968
1993 SNA	System of National Accounts 1993
2008 SNA	System of National Accounts 2008
15th ICLS	Fifteenth International Conference of Labour Statisticians
ABS	Australian Bureau of Statistics
AAC	Addiction Action Campaign
Eurostat	European statistics
AfDB	African Development Bank
AFS	Annual Financial Statistics
AFSUN	African Food Security Urban Network
APC	South African Adult per capita alcohol Consumption
ASM	Artisanal Small Miners
BACSA	Business Against Crime South Africa
BATSA	British American Tobacco SA
BEE	Black Economic Empowerment
CIA	Consultancy Africa Intelligence
CS	Community Survey
CS	Credit Suisse
DAFF	Department of Agriculture, Forestry and Fishing
DME	Department of Minerals and Energy
DMR	Department of Mineral Resources
DTI	Department of Trade and Sector
DWAFF	Department of Water Affairs, Fishery and Forestry
HDI	Human Development Index
FAO	Food and Agriculture Organisation
FBW	Free Basic Water
FIC	Financial Intelligence Centre
FICA	Financial Intelligence Centre Act
FSB	Financial Services Board
GDP	Gross Domestic Product
GHS	General Household Survey
HPCSA	Health Professions Council of South Africa

IC	Intermediate Consumption
ICAP	International Centre for Alcohol Policies
ICSE-93	International Classification of Status in Employment
IFRS	International Financial Reporting Standards
ILO	International Labour Organisation
IMF	International Monetary Fund
IP	Intellectual Property
MCC	Medicines Control Council
NDMP	National Drug Master Plan
NDP	National Development Plan
NERSA	National Energy Regulator of SA
NIBUS	National Informal Business Upliftment Strategy
No	Number
NOE	Non-observed economy
NPIs	Non-profit Institutions
NTFPs	Non-timber Forest Products
OECD	Organisation for Economic Co-operation and Development
QES	Quarterly Employment Statistics
QLFS	Quarterly Labour Force Survey
RIP	Regulation Ignition Propensity
SADTC	South Africa Dentist Technicians Council
SAFACT	Southern African Federation against Copyright Theft
SAMSET	SSA Municipalities with Sustainable Energy Transitions
SANHTRL	South Africa National Human Trafficking Resource Line
SAPS	South Africa Police Survey
SARB	South African Reserve Bank
SARS	South Africa Revenue Services
SATAWU	South African Transport and Allied Workers Union
SDGs	Sustainable Development Goals
SESE	Survey of Employers and the Self-employed
SIC	Standard industrial Classification
SMME	Small, medium and micro enterprises
SSA	Sub-Saharan Africa
SSM	Small-scale Manufacturing

Stats SA	Statistics South Africa
SWEAT	Sex Worker Evaluation and Advocacy Taskforce
TISA	Tobacco Sector of South Africa
UN	United Nations
US	United States
UN ODCCP	United Nations Office of Drug Control and Crime Prevention
VA	Value added
VAT	Value Added Taxes
WGC	World Gold Council
WHO	World Health Organisation
XTC or LSD	Hallucinogens

CHAPTER 1: INTRODUCTION

1.1 Background

Determining the total size and/or monetary value of economic activities within a country's production boundary is a word-wide challenge. This is equally applicable to South Africa (SA). The total output of an economy, also seen as gross domestic product (GDP), includes the informal sector and non-observed [1] economy (NOE) activities. The size of SA economy is measured on a quarterly and an annual basis by Statistics South Africa with the GDP statistical release P0441, Gross domestic product (GDP)", 4th quarter, excel tables.

The dissertation focusses on the possible over-/under estimation of the NOE activities as the assumption is made that the formal sector is accurately measured by Statistics South Africa. It is a worldwide problem for national accountants to measure the NOE sector accurately and to include the measurement of NOE activities in the estimates of the economy in a whole. There are international guidelines developed by the International monetary Fund (IMF), United Nations (UN), Statistical office of the European communities (Eurostat), and the organization for Economic cooperation and development (OECD) to assist national accountants to measure the total output of an economy. The international guidelines include the 1993 System of National Accounts (1993 SNA), OECD (2002), revised SNA (2008 SNA), and the Eurostat (2018) published documentation. The 2008 SNA, that supersedes the 1993 SNA, form the basis for national accountants to determine the GDP. The OECD (2002), "*Measuring the non-observed economy. A handbook*" Eurostat (2018), *"Handbook on the compilation of statistics on illegal economic activities in national accounts and balance of payments*" were developed to supplement the 2008 SNA with specific references to the treatment of the NOE.

The GDP is a primary indicator to measure the health of a country's economy. The GDP metric allows policymakers and central banks[2] to determine the size of the economy and to determine whether an economy is expanding or contracting, and whether it needs a change to fiscal and/or monetary policy.

[1] Non-observed sector includes informal, underground activities, grey activities, illegal activities production by households for own and final use and informal activities (Eurostat 2018:26).
[2] Noted that each country's central banks have different mandates, South African Reserve Bank (SARB) for example used CPI as the primary measure as their purpose is to protect the value of the currency and not the growth of the economy whereas the central bank of United States (US) does monitor growth more closely.

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When the size of the economy is incorrectly measured it has an impact on the over-/underestimation of the growth rate[3] of an economy, employment data, GDP per capita[4] and the poverty rate in the country. It can also be negatively impact on overseas investment, estimations of economic activity by sector and the current expenditure and tax income of the economy. These data sources feed into policy decisions for both fiscal and monetary policies, thus creating incorrect feedback if data is incorrectly measured.

The term 'non-observed economic activities' was introduced in the economy by different people, i.e. groups of experts (Delhi group) and national accountants who follow international guidelines trying to find different ways of fully calculating the size of NOE activities. The first introduction of the term 'informal sector' was made by social anthropologist Keith Hart (1971:66-70) who was the leading scholar to bring the term 'informal sector' into academic literature. In a document of Davids (2011), the definition of the informal sector was first introduced in 1971. The debate continues regarding the definition of the term 'informal economy' and the methods used to measure the size of the informal economy. In recent years, a more commonly accepted definition of informal economic activity emerged which was included in the 2008 SNA. The 2008 SNA explained that a group of statistical experts (the Delhi group) was assigned the task of defining and describing the characteristics of the informal sector. The Delhi group exchanged expertise in the calculation of the informal economy, documentation on informal sector data collection methods, providing advice on survey methodologies, formulating recommendations to improve the quality of informal sector statistics and to compare country experience when measuring the informal sector.

In the latter years more case studies of different countries became available where it is mentioned that the NOE of many countries are underestimated and it has an impact on the GDP calculations of such countries. Countries where the NOE is underestimated include Australia, Belgium, Denmark, Italy, Luxemburg and the Nederland's to mention a few (Eurostat 2018:78-79). If the illegal activities[5] are not accurately measured, it has an impact on the GDP[6] of a country. These case studies are discussed in detail in the Eurostat (2018) handbook and can be applied to the SA economy to determine the size of NOE activities more accurately. Case studies in Australia show illegal drugs

[3] The growth rate is seen as the percentage increase/decrease of GDP from the previous measurement cycle.
[4] Trend in living standards.
[5] Illegal activities include grey economy activities and underground activities.
[6] GDP also refers to measuring of the monetary value of a country.

contributed AUD 5 392 million to the value added (VA)[7] of Australia in 2010 (Eurostat 2018:78). In Belgium where prostitution is not legalised, it is estimated to have added between EUR 531 million and EUR 775 million towards the value added (VA) of Belgium in 2015. The latter estimations is twice as much as the original calculations of illegal services (Eurostat 2018:80). In Denmark illegal activities such as the smuggling of alcohol, tobacco, drugs and soliciting prostitution services added DKK 2 296 million in 2004 towards the value added of the GDP (Eurostat 2018:83). In Italy illegal activities such as prostitution, drugs and smuggling contributed EUR 14 332 million towards the total GDP in 2011 (Eurostat 2018:86). These examples clearly indicate that when illegal activities are included in the economy, it impacts the GDP[8] of an economy. Luxemburg's value added on NOE activities – just for illegal drugs and prostitution alone – amounted to EUR 108 million in 2013 (Eurostat 2018:87). The Nederland' value added on illegal drugs, prostitution, employment, gambling, copyright and smuggling were underestimated to be EUR 3 595 million in 2008 (Eurostat 2018:89).

Taking the above into consideration, this study sets out to establish whether the size of the NOE activities of SA's economy by sector for 2011 and 2016 is possibly over-/underestimated. The researcher based her study on the NOE definition of the 2008 SNA and the latest international guidelines published, as mentioned in paragraph 2 of this section. These calculations will allow national accountants to supplement current GDP calculation by sector, thereby improving the quality and accuracy of the GDP measurement.

1.2 Research problem

The research problem deals with the possible over-/underestimation of NOE activities and the impact of that on accurately measuring South Africa's GDP. The researcher attempts to establish if certain sectors, with a special focus on the NOE activities (the informal sector/small scale sector and illegal sector in South Africa), are totally accounted for in GDP calculations. It should be noted that the likelihood does exist that some of the activities will not be completely covered because of the illegality and/or hidden nature of the activity. It is important to determine the over/underestimation of economic activity value in each sector separately, as the treatment of different economic activities differs. An economic sector is classified under the standard industrial classification (SIC) for all economic activities. The SIC is the South African version of the ISIC Rev 3.1, whereas ISIC Rev 4 is the

[7] Value added is defined as output minus intermediate consumption in economics terms.
[8] The GDP growth rate measures the speed at which a country is growing by comparing one quarter growth over previous quarter growth rate whereas the GDP measures the output of an economy.

current standard throughout the world. The SIC classify the economy in nine main sectors. These sectors are examined in more detail in Chapter 3 to Chapter 6.

The researcher uses a specific methodology in line with SNA 2008 which comprise inter alia statistical analyses of available data as well as meta analyses of statistical releases to determine each sector's NOE value to supplement current GDP estimates. These methodologies, statistical releases and analyses are discussed in Chapter 3 to Chapter 6 under the relevant economic sector to which each methodology, statistical release or analytical method pertains. The main focus is at the 1-digit sector level, and sector disaggregation is not discussed. In cases where sub-sectors are discussed, it is mentioned under a specific section in Chapter 3 and the reason is supplied. This research will not deal in detail with the formal sector, although it is used to determine the size of each economic sector. The data of the formal sector is used as published in the GDP statistical release NO P0441, "Gross domestic product", 4th quarter.

The problems the researcher encountered while establishing an estimate for the size of the informal sector and illegal activities by sector included problems such as:

1. To what extent is the value added produced by the informal sector estimated?
2. To what extent is the value added produced through illegal activities estimated?
3. To what extent is the total economic value added currently over-/underestimated?
4. This dissertation bases its research on prescribed international guidelines; this allows national accountants to implement/supplement the current GDP estimates.

Each of these questions are answered in Chapter 3 to Chapter 6 under the specific economic sector. An overview and conclusion of the overall estimation results are being provided in Chapter 7.

1.3 Research questions

The aim of this research is in line with the following research questions:

1. Is the total primary sector value added accounted for in the GDP estimates? The method used to determine whether the total primary sector has been taken into account is to determine the size of this sector's over-/underestimation. The size of this sector can only be determined when the sector's data is disaggregated into formal sector, informal sector and illegal activities.

2. Is the total secondary sector value added accounted for in the GDP estimates? The method used to determine whether the total secondary sector has been taken into account is to determine the size of this sector's over-/underestimation. The size of this sector can only be determined when the sector's data is disaggregated into formal sector, informal sector and illegal activities.

3. Is the total tertiary sector value added accounted for in the GDP estimates? The method used to determine whether the total tertiary sector has been taken into account is to determine the size of this sector's over-/underestimation. The size of this sector can only be determined when the sector's data is disaggregated into formal sector, informal sector and illegal activities.

4. Is the total economy value added accounted for in the GDP estimates? The method to determine if the total economy value added (formal sector and NOE economic activities) is accounted for in GDP estimates, is to determine the size of the economic value added over-/underestimation in each sector[9]. Determining the total size of economic value added of each sector is only possible if all sectors' data are disaggregated to establish each sector's formal, informal and illegal activities.

The formal sector discussed in Chapter 4 to Chapter 6 is taken directly from statistical release P0441, as the assumption is that the formal sector is measured as closely as possible. Therefore, this study does not focus on the formal sector, although it is important to take the formal sector in consideration when measuring the specific sector size. The newly estimated informal sector is added to the formal sector and illegal sector estimates to determine the size of the specific economic sector under discussion, in order to assess whether each sector is over-/underestimated in existing GDP calculations.

5. Are the latest published international guidelines (2008 SNA, OECD and Eurostat) implemented by Statistics South Africa when measuring the formal and NOE activities? The said international guidelines allow South Africa and other developing countries to measure NOE activities more comprehensively to ensure that the GDP's of such countries can be directly compared to that of developed countries. This statement is important as it allows national accountants to adopt the methodology and supplement the current estimates to determine the real size of the South African economy as a whole.

[9] When referring to an industry it also means an economic sector. An Industry is classified based on the Standard Industrial Classification for all economic activities (SIC).

6. Are the definitions and characteristics of the NOE sector based on internationally recommended guidelines and decisions taken by international expert groups specialising in national accounts? The importance of using the correct definitions and characteristics ensures that the GDP is correctly measured and that national accountants can implement the methodology in current GDP estimations. The advisory group on national accounts in an article "The informal sector in the 1993 SNA, rev.1" by I. Havinga & C. Carson (2006) indicates that the 2008 SNA and the OECD (2002) publication, *Measuring the Non-Observed Economy – A Handbook,* on measuring the informal sector and NOE characteristics and definitions should be applied to measure the NOE economy activities. These definitions and characteristics are explained in Chapter 2 and applied in the rest of the thesis.

1.4 Importance of the study

This dissertation's focus is to measure GDP as accurately as possible by determining the possible under/over-estimation of NOE activities. The research allows national accountants to supplement/implement the methodology of the NOE to ensure a closer measurement of the size of the South African economy. This methodology should be in line with prescribed international standards, correct classification, characteristics and definitions for determining the true value of NOE activities. It identifies the size of sectors that could be over-/underestimated based on the 2008 SNA and OECD 2002. This study provides a detailed analysis of each sector - informal sector, small scale business sector and illegal activities. This ; allows national accountants, of South Africa, to use the results as a base for further research and implement it in the current GDP estimates. Furthermore, this research is useful for other developing countries to measure the full value of their NOE economy activities. It allows these countries to follow the same approach and gives guidance on the different types of surveys used from the statistical offices and alternative data sources.

1.5 Research methodology

The dissertation adopts a quantitative methodology as data provides the numbers serving a descriptive purpose, i.e. the size of a specific sector disaggregated by formal, informal and shadow economy activities. A detailed discussion of the Research Methodology follows in Chapter 3.

This dissertation uses statistical analyses (meta-analyses) to link the unknown with the already existing published statistical data (Soiferman, 2010:4). The researcher addresses this objective of the study by analysing new calculations of the informal sector, small scale business sector and non-

observed economy activities and evaluates the results against the existing statistical published releases with respect to GDP by sector. This allows the researcher to meet the objective and aim of the study. The results of this research allow the researcher to answer the research question, identify the limitations of the study and make recommendations for future analysis.

1.5.1 Primary sector research methodology

The primary sector consists of the agriculture sector (SIC 1) and mining sector (SIC 2). Although it has been indicated that this dissertation will not focus on subsectors, it is important to discuss agriculture's subsectors as the economic activity of each subsector differs. The agriculture sector's subsectors consist of the agriculture subsector, fishery subsector and the forestry sub-sector. To determine the total primary sector size and over-underestimation of this sector, major and sub-sectors discussion is further divided into separate headings namely the formal sector, informal sector, own account sector and illegal sector activities. To solve the research problem the thesis follows a meta-analysis approach which is discussed under point 1.5.5.

1.5.2 Secondary sector research methodology

The secondary sector consists of the following major sectors, namely the manufacturing sector (SIC 3), electricity sector, water sector, gas sector (SIC 4) and the construction sector (SIC 5). Although it has been indicated that this dissertation will not focus on subsectors, it is important to discuss the electricity, water and gas sectors as subsectors, since the economic activity of each subsector differs. The electricity and gas sectors are discussed as one sector, whereas the water sector is discussed separately as the economic activity differs. To determine the total secondary sector size and under/over-underestimation of this sector, major and subsectors discussions are further divided into separate headings namely the formal sector, informal sector, own account sector and illegal sector activities. To solve the research problem the dissertation follows a meta-analysis approach which is discussed under point 1.5.5.

1.5.3 Tertiary sector research methodology

The tertiary sector consists of the following major sectors, namely the wholesale trade sector, retail trade sector, hotel sector and restaurant sector (SIC 6), transport storage and communication sector (SIC 7), financial intermediation, insurance, real estate and business services (SIC 8), community, social and personal services (SIC 9) and private households, as employers, extraterritorial

organisation, beggars, people living from handouts, people seeking work and other activities not elsewhere classified (SIC 0). Although it has been indicated that this dissertation will not focus on subsectors, it is important to discuss some of these sectors - SIC 7, SIC 8, SIC 09 and SIC 01 – separately, as the economic activities differs under the major group. To determine the total tertiary sector size and possible under/over-underestimation of this sector, the discussion of major and subsectors is further divided into separate headings namely the formal sector, informal sector, and illegal sector activities. To solve the research problem the thesis follows a meta-analysis approach which is discussed under point 1.5.5.

1.5.4 Total economy research methodology

The total economy consist of the primary sector, the secondary sector and the tertiary sector. These sectors are added together to calculate the overall economy's size and possible over-/underestimation. To solve the research problem this dissertation follows a meta-analysis approach which is discussed under point 1.5.5.

1.5.5 Research methodology discussion

For all the sectors and the total economy, the meta-analysis takes place by firstly disaggregating all current published GDP data from the statistical release P0441, *"Gross domestic product (GDP)", 4th quarter*. This ensures that the formal sector and the NOE sector are separated from each other by sector, as this dissertation only focusses on the NOE sector over-/underestimation. The formal sector will not be investigated with respect to possible over-/underestimation. Secondly, the NOE sector calculations are split between the informal and the illegal activities. This allows the researcher to establish which of these sectors are over-underestimated. Thirdly, the two sectors are added together and evaluated against the published NOE data. Fourthly, the current published formal data and new estimates of the NOE are added together to determine the over-/underestimation of the specific sector. Lastly, the researcher concludes with the results, recommendations and limitations of the specific sector examined.

1.6 Outline of the study

This dissertation is structured in such a manner that it fully addresses the research problem and research question stated in section 1.2 and 1.3. This is being done by estimating the published undercount in the primary sector (research question 1), secondary sector (research question 2), tertiary sector (research question 3), the total economy (research question 4), and the research question 5 and research question 6. The chapter layout based on this endeavour to address the six research questions, is as follows:

- Chapter 1 of the research provides a background on the research dissertation. The chapter includes the research problem, aim of the study, objectives of the study, the importance of the study, research methodology and the limitations that the research can encounter when discussing each sector separately.

- Chapter 2 examines the definitions and characteristics of the NOE sector activities in line with international guidelines. It explores how characteristics and definitions change over time when international guidelines are updated, and the implications of this.

- Chapter 3 provides the conception framework and methodology underpinning the estimation of estimating the size of the value added by non-observed economy activities in all sectors.

- Chapter 4 examines the measurement of the size of NOE activities of the primary sector. It includes the different surveys that are used to ensure that the calculation is according to international standards. It calculates the size of NOE activities by sector. This includes calculations of the agriculture, mining, fishery and forestry sectors.

- Chapter 5 examines the measurement of the size of NOE activities of the secondary sector. It includes the different surveys that are used to ensure that the calculation is according to international standards. It calculates the size of NOE activities by sector. This includes calculations of the manufacturing sector, electricity and water sector and the construction sector.

- Chapter 6 examines the measurement of the size of NOE activities of the tertiary sector. It includes the different surveys that are used to ensure that the calculation is according to international standards. It calculates the size of NOE activities by sector. This includes calculations of the wholesale and retail, transport, financial, public administration and other sectors, not classified elsewhere.

- Chapter 7 gives a summary by sector (primary sector, secondary sector and tertiary sector) of the NOE in a table format and compares it with existing GDP calculations - with the aim to determine possible sectoral GDP over-/ underestimations. It explains the results of the thesis underestimations.

- Chapter 8 concludes the dissertation by mentioning some limitations experience, provides recommendations for future studies and gives an overall conclusion.

CHAPTER 2: DEFINITIONS AND CHARACTERISTICS OF INFORMAL SECTOR AND THE ILLEGAL ECONOMY ACTIVITIES

2.1 Introduction

Chapter 1 addressed the background, the aim of the study, the research problem, the research questions as well as the research methodology being followed in this study. Furthermore, it mentioned that this chapter will address the characteristics and definitions of internationally accepted standards with respect to the measurement of non-observed economic activities. This ensures that national accountants use the correct characteristics and definitions to measure the NOE sector for the purpose of calculating the GDP.

Since the 1970s, the term *informal sector* became widely-used and efforts were made to develop specific definitions to assist with statistical estimation. In the early 2000s, there was a call for improved statistics on the informal economy, and more specifically, statistics that capture informal employment both outside and within the formal sector. An international forum of statisticians known as the Expert Group on informal sector Statistics (the Delhi Group) was established to look into the broader concept of informality. At the International Labour Conference in 2002, and again in 2003 at the International Conference of Labour Statisticians, a lot of work went into developing guidelines and improving the quality of statistics to ensure consistency in measuring the informal sector. As mentioned before, the 2008 SNA in Chapter 6 gives guidelines on the definitions and characteristics of the informal sector based on the ILO recommendations and the work done by the Delhi Group. These discussions of the ILO and the Delhi Group are the basis of the definitions and features of the informal sector (OECD, 2002).

This chapter focuses on three published documents to determine the definitions and characteristics of the NOE sector. These documents are the 1993 System of National Accounts (1993 SNA), the 2008 SNA and the OECD (2002) publication. The reason for the discussion of the 1993 SNA and the 2008 SNA, is because the 2008 SNA is the revised 1993 SNA and these documents form the basis for national accounts. Further, as indicated in Chapter 1 point 1.3, the advisory group recommended that the OECD (2002) together with the 2008 SNA should form the basis to implement the NOE economy activities sector for national accountants.

A fourth document that focuses on the sector classification will also be discussed. This classification document is in line with international standards, and although the latest version has not been implemented by Statistics South Africa, the data is based on the current document that is used, namely the Standard Industrial Classification of all Economic Activates (6th Edition, 2006). This is referred to in Chapter 1 as well. The correct classification ensures that the levels of the NOE activities are accurately measured annually by sector.

2.2 Definitions and characteristics of the NOE sector

The **informal sector** and **illegal[10] activities are** that part of an economy that is neither taxed, nor monitored by any form of government. Unlike the formal economy, activities of the informal economy are not included in the gross national product (GNP) and gross domestic product (GDP) of a country.

Some of the discussions below might seem to have the same definitions and characteristics, but all of these are mentioned separately to show how they have changed over time. The discussions will also indicate how national accountants need to adjust definitions and characteristics to be in line with international standards and the fast-growing NOE sector – especially in sub-Saharan African countries.

2.2.1 The 1993 system of national accounts

2.2.1.1 Background

The 1993 SNA, Chapter 9:97, refers to the concepts and definitions of the informal sector. Studies of countries in sub-Saharan Africa (SSA) show that the informal sector represents between a quarter and two-thirds of national accounts GDP calculations, depending on whether the agriculture sector is included or excluded in the economic measurements. The 1993 SNA refers to the definition and characteristics of the informal sector, but makes minimum reference to illegal activities.

The 1993 SNA classifies the informal sector in detail and mentions a couple of characteristics of the informal sector. However, the disadvantage is that the 1993 SNA does not expand more on such illegal activities. According to the 1993 SNA, studies carried out in SSA indicate that the informal

[10] Whenever reference is made to illegal activities/sector it includes grey economy and underground

sector represents between two thirds and one quarter of the total economy, although it depends if the agriculture sector is excluded or included (1993 SNA:97).

2.2.1.2 Definition of the informal sector and illegal economy activities

The informal sector is considered as units engaged in the production of goods and services with the objective to generate income and employment. These units are low-level organisations with little or no division between capital and labour. The 1993 SNA defines the informal sector as activities that should be included in national accounts because they form part of the production process.

2.2.1.3 Characteristics of the informal sector and illegal economy activities

The 1993 SNA mentions the following characteristics of the informal sector (it should be noted that it does not mention illegal activities separately):

a. The characteristics of the informal sector may be described as units engaged in the production of services and goods with a main objective to provide employment to people. It does not refer to specific characteristics as mentioned in the 2008 SNA. These businesses operate on a low turnover and on small scale, as no differentiation is made between capital and labour input (1993 SNA: 9.2).

b. The 1993 SNA mentions that the informal sector has the same feature as household-owned businesses. Fixed assets and other assets belong to the owner. The owner needs to raise capital for start-up costs and is personally liable for risk and debts. Sometimes the expenditure from the business is part of the household expenditure as well (1993 SNA: 9.3).

c. The activities by the informal sector are not always to evade taxes. It is often simply too small to register for tax purposes, and the activities could be undertaken only for self-sustainability (survival). Although the 1993 SNA makes it clear that the informal sector must not be confused with illegal activities, it does not mention the characteristics of these activities (1993 SNA: 9.4).

d. The 1993 SNA elaborates by classifying the informal sector as a group of production units owned by households, e.g. enterprises and unincorporated enterprises. It mentions that the informal sector is operated by own-account workers such as family members, and that production units could be run on a permanent or casual basis (1993 SNA: 9.5).

e. The informal sector is further defined as informal, irrespective of the workplace where the business is carried out (1993 SNA: 9.6).

f. Additional criteria are the workplace (a small fixed site, the household home, or a footpath in open spaces, e.g. street vendors). In certain countries the criteria that are used to determine the informal sector are whether the business is registered, and whether it has a licence, but this is not a standard consideration all over the world.

g. The informal sector often does not have a full set of accounts, which makes it difficult to separate expenditure and production.

According to the 2008 SNA (2008 SNA: 25.46), normally not only one characteristic is used to identify the informal sector but rather a couple of characteristics are used to identify the informal sector. The 2008 SNA considers the following questions when characterising the informal sector:

a) Is this central to the definition of activity undertaken by a unit considered to be an informal enterprise; and

b) Is it the basis for reaching a definition that will yield internationally comparable results? (2008 SNA: 473:25.19).

2.2.2 The 2008 system of national accounts

2.2.2.1 Background

The System of National Accounts 2008 (2008 SNA) forms the basis of the research conducted for the purposes of this study, as it is a revised system of national accounts which enhances inter alia comparability between countries with respect to GDP calculations and it ensures that it is in line with international standards. South Africa already partially implemented the 2008 SNA (Statistics South Africa Report: D0904) and is still progressively implementing further parts thereof. Some additions to the characteristics and definitions have been made to include the fast-growing NOE activities.

The most significant shortcoming of other research on the NOE sector is that the research is not based on the 2008 SNA and OECD (2002 - Chapter 10, section 10.3) recommendations. One of the recommendations refers to the NOE sector that should include rural and urban statistics e.g. taking

into account the study of Charman et al. (2016), it refers to the Delft area (point 2.5 below) in the Western Cape - these statistics cannot been extrapolated to represent the entire population. The recommendation of the OECD (2002) document indicates that rural and urban statistics should be included to measure Illegal activity. This article only includes the rural area. Further, most of the data published in respect of South Africa is administrative data and does not explain the methodology behind the findings. For example with illegal mining the former minister of mining Susan Shabangu quoted an amount of R20 billion[11] losses in illegal mining and in a media article of News24 (2018)[12] it is reported that South Africa loses R628 million per annum on illegal abalone poaching, but no formal methodology is indicated how to determine the illegal activities.

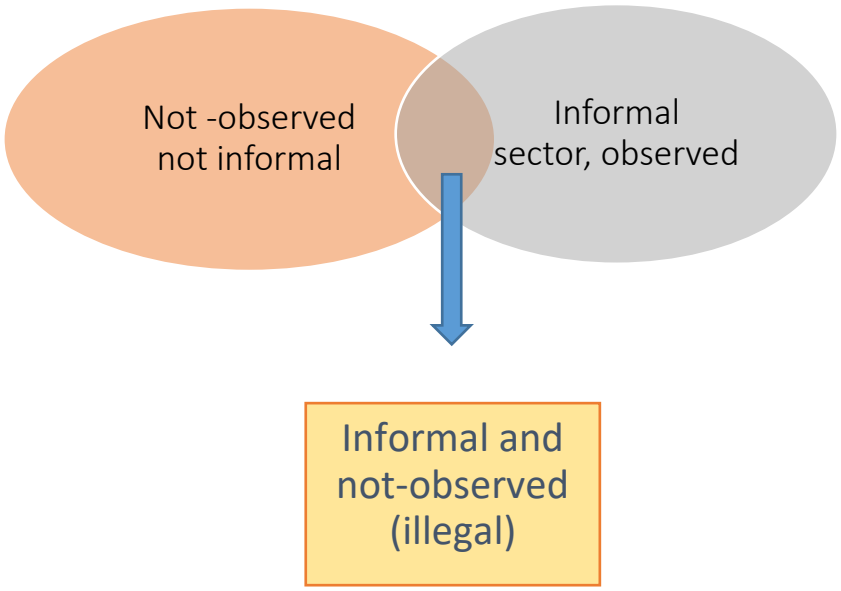
It is important to clarify the definition of the informal sector according to the 2008 System of National Accounts (2008 SNA), as the research must be in line with the recommendations of the 2008 SNA to calculate the size by sector of NOE sector. The reason for this is to ensure that national accountants, stakeholders and researchers can use this as a basis for the correct measurement of the NOE sector. The 2008 SNA gives guidelines, recommendations, definitions and concepts according to internationally accepted accounting rules on how to calculate the GDP. The GDP measures a country's overall economic performance. The GDP is a combined measure of production, namely it equals the total of value added of all residents and institutions engaged in economic production minus subsidies on products plus taxes on products. Gross value added is the difference between outputs and intermediate consumption. The value added is calculated on a quarterly and annual basis. This research is based on the latest international standards to calculate the size and sector of NOE activities to ensure that the value added by sector is measured correctly.

The 2008 SNA (Chapter six) provides guidelines on what definitions to use and what the features of the NOE sector are. It also refers to the International Labour Organization (ILO) classification of the informal sector. Chapter 25 of the 2008 SNA discusses various aspects pertaining to the informal sector. Two recommendations of the 2008 SNA exist to ensure that total economy is measured: firstly, calculations are not complete without including the “hidden” or “underground” activities. The second recommendation is to measure the size of the informal sector by sector or activity.

[11] https://www.miningreview.com/gold/illegal-mining-rules-game-south-africa/
[12] https://www.news24.com/Green/News/sa-has-lost-96-million-abalone-to-poaching-since-2000-new-report-20180919

According to the 2008 SNA, the two arguments overlap, as is illustrated in Figure 2.1.

Figure 2.1: Informal and non-observed economy



When considering Figure 2.1 (2008 SNA: 471), an overlap does exist between the informal economy and the illegal economy, but the size of overlap will differ from country to country. The overlap exists between non-observed activities undertaken informally, e.g. street vendors that sell cookies on the street. Another example is taxi drivers. In South Africa, administrative data is used to determine the informal sector, and taxi drivers are classified under the informal sector of transportation. The first oval in Figure 2.1 (orange oval) represents not-observed activities and not informal economy. An example is a hairdresser who has fewer than 10 workers and who works in the backyard of a house. The last explanation is the informal sector but observed, e.g. teaching privately for monetary compensation (2008 SNA: 471-472).

A problem area of the NOE economy is the underground activities that relate to illegal activities. The underground economy ('black market' or 'shadow economy') is illegal because firstly, services and goods that are traded are illegal and secondly, transactions that do appear to be legal do not comply with the reporting requirements of the government. Sometimes the trading can be legal but the way

in which the trading takes place is illegal, for example, it is legal to trade cigarettes from a shop, but if such trade is undertaken on the black market, it is illegal (2008 SNA: 2009: 472).

2.2.2.2 Definition of the informal sector and illegal economy activities

According to the 2008 SNA, the informal sector is defined as units, businesses or people in the production process with the objective of creating jobs for themselves. It comprises units that operate at a low level with little or no capital investment, on a small scale. Labour is based on casual employment, personal employment or relatives that are employed in the business.

Furthermore, the 2008 SNA indicates that interest in the NOE has increased. One example the 2008 SNA refers to is that certain sectors do not comply with safety regulations, which can be seen as illegal, and the evasion of taxes is seen as a criminal offence. Further examples are mentioned below and pertain to illegal activities that are legal in some countries, e.g. sex work. However, the 2008 SNA makes it clear that the purpose of the 2008 SNA is not to fix the dividing line between informal sector and illegal activities, but to make sure that all the production activities within the boundaries of a country are included (2008 SNA: 6.39-6.42).

The 2008 SNA refers to two kinds of illegal production: firstly, where sale and production of goods and services are forbidden by law, and secondly, where production that is usually legal becomes illegal when carried out by unauthorised producers. These can include the production of illegal transportation, narcotics, smuggling and services such as prostitution (2008 SNA: 6.43).

2.2.2.3 Characteristics of the informal sector and non-observed economy activities

The 2008 SNA takes the following characteristics into consideration when defining a business as part of the informal sector:

a. Registration

This is very difficult to determine as a characteristic of the informal sector. In some countries it is necessary that all businesses should be registered, and those that are not registered are seen as informal businesses. In other countries, a business that has a specific turnover should be registered, and if its turnover is lower than the given amount, they do not need to register. In South Africa, a business with an annual turnover of less than R300 000 does not have to register. Does this mean

that this business is part of the informal sector? If registration is taken into account, this characteristic of the informal sector is not internationally compatible and therefore it cannot be seen as a characteristic. Registration of the size of the business and official requirements differ from country to country.

b. Legal incorporation

Legal incorporation is linked to the characteristic of registration. According to the 2008 SNA, all legal businesses fall into the corporation services category. However, the problem is that these corporation services include quasi-corporations. Quasi-corporations have a full set of accounts, for example, a balance sheet, and income and expenditure statements. If a full set of accounts does exist, this business falls under the formal sector and is not treated as an informal sector business. The problem still remains that it differs from country to country, which makes international comparison difficult (2008 SNA: 25.20).

c. Size

By means of statistical analyses, the size of a business can be determined by the number of employees or turnover. The problem with the turnover definition of businesses is that it can differ from country to country, and international comparability can be difficult. Taking this into consideration, the informal sector definition between countries can also differ when taking turnover into account. Furthermore, the number of employees in a business also creates problems as far as comparability between countries is concerned. In some countries, a small business with very few employees will have a full set of accounts and will fall under corporations (i.e. the formal sector), whereas in other countries, it would be part of the informal sector, i.e. businesses with fewer than five employees are seen as businesses belonging in the informal sector (2008 SNA: 25.21).

d. Statistical survey coverage

Established surveys differ largely from country to country. Developing countries have less established statistical surveys and it is difficult to determine the size of the informal sector. In developed countries, the surveys are well-designed and better able to capture the size of the informal sector more precisely. Before the revision of the 2008 SNA, the assumption was that the informal sector existed mainly in developing countries, but it was soon realised that the informal sector forms part

of developed countries as well. For international comparison, the EU decided that all countries should include the informal sector as part of the calculation of the value added of sectors (2008 SNA: 25.23-25.28).

e. Activity boundaries

Some economic activities are on the borderline of including/excluding from the NOE economy. Economic activities that are excluded are services produced by households for own consumption, whereas owner occupied housing services are included. (2008 SNA: 25.24).

f. Illegal activities

The 2008 SNA makes it clear that even if an activity is illegal, it should not be excluded from the calculations of the GDP, because these activities are still taking place within the boundaries of the country. This statement is questioned because not all activities will always be included because they are hidden, but as far as possible these should be measured.

In some countries the illegal activities are hard to capture because of the non-existence of data or because they are simply being ignored. If activities such as smuggling of drugs are being ignored, it can lead to an underestimation in the value added in certain sectors, and thus at the end, an underestimation of the GDP of a country. It should be noted that illegal activities in countries can differ, e.g. sex work in one country can be legal, whereas in other countries it is illegal. In South Africa dagga was decriminalised in 2017, for personal consumption by adults in private, but laws still prohibit the trade of dagga. Difficulty exists in comparing data between countries regarding the informal sector and illegal sector. Some countries see certain activities as legal and other countries see them as illegal with the consequence that just a certain portion of all activities form part of the production of a country. If an activity is legal, it will form part of the formal sector and will be captured (2008 SNA: 25.25).

g. Locality

In some countries the informal sector is mostly analysed in urban areas or in the metropolitan areas, and although the analysis captures most of the data, it still needs to include the informal sector in

the rural areas. If a country wants to be internationally comparable to other countries, all informal activities must be calculated as part of a country's production (2008 SNA: 25.26).

h. Employment terms

In some jobs the employer offers certain social benefits to the employee, and these are seen as part of the formal sector. Self-employed people normally do not make provision for these types of benefits, e.g. a hairdresser working for him/herself in a backyard. These are seen as informal jobs and are calculated as part of the production of a country. The problem is that in many countries these jobs are seen as part of the formal sector – it normally depends on a country's cut-off amount with regard to turnover. It still remains a challenge to compare the informal sector between countries (2008 SNA: 25.27).

2.2.3 Measuring the non-observed economy – An OECD handbook

2.2.3.1 Background

Measuring the NOE consists of several methods, but to ensure international comparison of national accounts there was a need to detect and endorse the best international practices. The aim of the OECD handbook is to determine NOE calculations based on the 1993 System of National Accounts (1993 SNA). Although *Measuring the Non-observed Economy – A Handbook* is based on the 1993 SNA, it will form a crucial part of the calculations of NOE based on the 2008 SNA. Currently, Statistics South Africa (Stats SA) is compiling the GDP, based on the partial implementation of the 2008 SNA (*Statistics South Africa, 2012 report No D0409*).

2.2.3.2 Definition of the informal sector and illegal economy activities

According to the OECD's handbook (2002) the NOE activities are defined as activities that are not measured in accordance with the basic data in which national accounts are hoarded (OECD, 2002:220). The Handbook includes a chapter on the definition and characteristics of NOE activities.

The OECD (2002:162) indicates that an acceptable definition of NOE activities should be broad enough to include all countries, and the definition should be flexible and more country-specific, although the difference in definition can affect the comparability of different countries – especially between developed and developing countries. The Handbook made it clear that the informal sector

should be defined according to the characteristic of the business and not of the people who are involved. Secondly, the business could be an unincorporated household, meaning that it is owned by households, and lastly, it can include a family that works in a family business without remuneration, or the owner of a business who works for himself.

The definition of underground activities and illegal activities is that these activities are undertaken to avoid paying taxes, or paying social securities, or to meet certain legal standards or to avoid complying with certain administrative procedures (OECD, 2002:137).

Based on Blades (1983), the Handbook refers to illegal activities as smuggling, production and distribution of illegal goods and services, the production of faked goods, resale of stolen goods, bribery and money laundering (OECD, 2002:153-155).

2.2.3.3 Characteristics of the informal sector and illegal economy activities

The Handbook distinguishes between the informal sector and illegal sector. The characteristics of the informal sector according to the Handbook include firstly, depending on the national circumstances, either all account enterprises or only those that are not registered under specific form of national legislation. Further it can also include small enterprises, businesses not registered and enterprises not registered because they comprise fewer than five employees (OECD, 2002:165-166).

2.2.4 Non-observed economy

The NOE includes informal, illegal economic sector see Figure 2.1.

2.2.4.1 Definition of NOE activities

NOE activities are seen as informal, illegal, underground or grey economic activities. It is normally not recorded because of illegality or not notable when it is informal, but it still remains part of the economy as the activity takes place within the boundaries of a country. These activities should be recorded in the national accounts of a country.

2.2.4.2 The 1993 System of National Accounts and NOE economy activities

The 2008 SNA makes it clear that a large interest exists regarding the growth in NOE activities. The NOE economy is a term that describes activities, which for one or other reason, are not covered by

statistical surveys. Reasons include that informal businesses do not want to declare its income or that it participates in an illegal/underground or grey economic activity.

2.2.4.3 The 2008 System of National Accounts NOE activities

It must be noted that the 2008 SNA includes underground, hidden or illegal activities in the calculations of the informal sector, whereas the 1993 SNA just mentions it but does not expand on it. Currently, this is becoming a major contribution to the size of the informal sector within the boundaries of the South African economy.

2.2.4.4 The NOE in *Measuring the Non-Observed Economy*

This is part of the research that has not been previously explored. The OECD handbook refers to the measurement of underground activities, thus, underground or grey economy, illegal production and then the informal sector. The handbook refers to surveys that can be used to measure illegal activities. These surveys include labour statistics, surveys of expenditure on goods and services, and tax audit data. The challenge here could be the tax audit data because of confidentiality issues.

Lack of data coverage leads to imbalances in the internal national accounts, since some of the sectors are underestimated or overestimated because the NOE activities are not accounted for. For example, a household's expenditure on services and goods produced 'underground' may be measured because the buyers have no reason to hide their buying, whereas the corresponding production activities are not reported by the manufacturers.

The Handbook uses the same characteristics of the 2008 SNA and 1993 SNA to measure the NOE activities, but makes it clear that with NOE activities, a variety of different but valid meanings exist (OECD, 2002:140).

Most of the above literature, e.g. 1993 SNA, 2008 SNA and the OECD (2002), contains almost the same characteristics with regard to NOE activities.

2.4.2 Characteristics of NOE activities

One of the characteristics of the illegal sector is off-the-record income. This can be because of businesses avoiding tax such as value added taxes (VAT), personal taxes, business taxes or other taxes.

Further, they deliberately do not declare the total turnover, they will duplicate bookkeeping (two sets of turnover record-keeping) or they will trade in cash. Sometimes businesses find it difficult to keep up with legal requirements and administrative issues, and then avoid taxes. Businesses also try to avoid social security benefits, working hours, and safety and health regulations and often find loopholes to avoid these. The 'illegal sector' involves the production of goods and services that are forbidden by law, as well as the production of goods that are legal but they become underground activities because of no licence, e.g. the production of unauthorised pharmaceutical products.

These activities are undertaken within the boundaries of the country and should form part of the calculations of a country's value added by sector.

2.5 Other authors' opinions with regard to the informal sector and illegal economy activities characteristics and definitions

Van de Ven (2014) uses the same characteristics as the 2008 SNA to define illegal activities and the informal sector. However, he mentions that the categories are sometimes difficult to determine, e.g. unlawful activities are not always illegal, and it relates to whether the activity is regulated or not. Van de Ven (2014) indicates that NOE estimates take place at various stages. First, data sources that are not reliable or biased are rectified by imputations, e.g. households that under-report tobacco use in expenditure surveys. Data is analysed by using an upper-bound maximum to determine the maximum size of the NOE activities. This is based on a wide array of survey data, administrative data and assumptions.

Gary Fields (Meier 2005: 273-275) supports the probabilistic migration model of Todaro and he distinguishes between the 'easy-entry' informal sector and the 'upper-tier' informal sector. Many people are in the informal sector by choice, and therefore this means the upper tier. A study in Costa Rica showed a number of reasons why people choose to be in the informal sector. Firstly, they felt that the informal sector could provide more money than they could earn in the formal sector, e.g. a 46-year-old man selling peanut butter sugar candy called *melcochas*. His brother had a small factory that produced *melcochas*, but closed it down when they realised that they make more money selling it directly to the public. Secondly, they enjoyed working in the informal sector even if it meant less money, because they could choose their working hours, and they preferred working in open areas and talking to friends. A further interview related to an old man who had a paid job in the formal

sector but who preferred to sell fruit in the street because he earned more money by doing it. This refers to the constraints of upper-tier informal activities. These people know that the opportunity for a formal job does exist, but they prefer informal jobs. These people prefer the combination of monetary and physical incentives of an informal job. A further example of the informal sector is that of a woman selling garlic in the streets of Kuala Lumpur. When someone passes, she calls out the price and tries to sell her product. If her product is sold out by midday, she takes the rest of the day off. If it is a rainy day, she will take the day off. If sales are slow, she will have longer working hours. These jobs are normally entry-free, and the owner is the only employee (Meier 2005:373).

On the other hand, Chen (2012) takes another approach and indicates that the informal sector can be described by different approaches, namely the dualistic school, legalist school, structural school and the voluntarism school approaches. The dualist school argues that with development and an increase in per capita income, the informal sector would disappear, particularly insofar as these entities were considered to be outlying to capitalist production systems (Chen, 2012). The ILO sees the urban economies in less developed countries as dualistic. Furthermore, the approach is that the informal sector is small in scale, labour intensive and unregulated, where the formal sector is large in scale, capital intensive and regulated. Secondly, the legalist school argues that the informal sector includes entrepreneurs who want to avoid the expenses and irritation associated with formalisation, particularly in relation to business and labour regulation and company tax. In this case, informal firms resemble their formal counterparts. This phenomenon is mainly found in high-income economies and in Latin America. In some middle-income Latin American economies such as Brazil, there is some proof of this due to extremely heavy tax regimes, high interest rates and high costs of regulatory compliance. The structuralist school considers the informal sector as part of a field within the market, although located in a lower position. This approach would consider the relations between formal and informal business, whether in buyer-supplier relationships, or in employment relationships such as contracting out or casualization. The informal sector contributes to the formal sector's risk mitigation and cost reduction strategies. Finally, the voluntarist school argues that people decide voluntarily to participate as informal operators. This is also discussed in a previous paragraph where Meier (2005) indicates that people are in the informal sector because of choice.

Barman (2013) wrote an article on the Delhi informal sector, which made up 90 percent of the Delhi workforce. He mentioned a number of examples that can be seen as informal sector characteristics,

namely no fixed salary, e.g. women who snip the threads off denims in a large multinational company. The multinational company subcontracts the cleaning-up process (snipping the threads off the denims) to contractors, with the agreement that the production should be done by these women. Some characteristics of the informal sector as identified by the Barman (2013) include inter alia that workers do not have a fixed wage, but receive rupees depending on the number of garments finished. They work on the basis of no-work, no-pay, and no social contributions are paid by the employer (i.e. insurance, medical benefits and pension). There are more examples of the informal sector in Delhi, such as domestic workers, cab drivers, security guards, shoe shiners and the workers who serve tea in teashops. A. Barman et.al (2013) in the Economic Times in," Informal workers, making up 90% of workforce, won't get a good deal till netas notice them", try to figure out how big the informal sector really is in India[13]. In this news article published in the Economics Times (2013), the authors discovered that half of India's $1.85 trillion economy is informal, and that only sub-Saharan Africa (SSA) has a larger informal economy than India in percentage terms (approximately 55 percent). In a working paper of M. Chen (2012:3), "The informal economy: Definitions, theories and policies", she refers to Vennek et.al (2012) that informal employment consists of more than 82 percent of non-agriculture employment in South Asia. The advantage of these two mentioned economic articles is that it can be used together with the handbook on measuring the informal sector to come close to measuring the NOE activities in South Africa. The disadvantage still remains that not all countries are the same, and a country-specific approach needs to be followed to measure the NOE activities.

In an article by Charman et al. (2016), it is revealed that spaza shops move around in the area of Delft in the Western Cape to avoid trading in the same place, possibly to avoid taxes or because these are illegal shops. Data was collected over a period of five years (between 2010 and 2015) and it was found that the informal sector in this township grew over 100 percent over a period of 5 years. The study inferred that data of informal businesses to determine the size is limited because of tax evasion and avoidance of reporting it in statistical data. They used the sample method, and enumerated a 3 km^2 area comprising 43 000 people and 11 000 households. The results show that Spaza shops and house shops represent 20.1 percent and 14.3 percent, respectively being involved in mainly trade and retail activities. The lesson from this article is that NOE activities more than doubled in one small urban

[13] https://economictimes.indiatimes.com/opinion/et-commentary/informal-workers-making-up-90-of-workforce-wont-get-a-good-deal-till-netas-notice-them/articleshow/24682274.cms

area, and that shops move around because of illegality/underground activities or grey economy increases; and it shows the urgency to ensure that NOE data is captured in the GDP. The shortcomings in the Delft study is that not a large area was covered, and therefore this cannot be accepted as a pattern in all townships. This article only captured trade and retail activities and did not cover the other sectors.

In 2010, the **World Bank Development Research Group**[14], Poverty and Inequality Team and Europe and Central Asia Region Human Development Economics Unit, published a paper on the shadow economy of 162 countries. The paper looked at specific definitions and characteristics used for the NOE. The definitions and characteristics used by the World Bank Expert Group are in line with the 2008 SNA, such as avoidance of taxes, social security contributions, to meet labour market standards (minimum wages, working hours and health and safety standards) and to comply with administrative issues. Furthermore, the paper looked at illegal activities such as drug dealing, robbery and crime activities and the indicators of a shadow economy such as monetary indicators, labour market indicators and the state of the official economy. These indicators are the major contributors to an underground economy, and residents in a country become involved in this economy purely for survival.

2.6 Operationalising the NOE definition for the purpose of the current study

Without elaborating on further characteristics and definitions, the rest of this dissertation is based on the 2008 SNA. The 2008 SNA definition of NOE activities includes the informal sector, small scale businesses, own account businesses and illegal sector - consisting of the underground-, shadow- and grey sector.

Definition of the informal sector in terms of the 2008 SNA – In terms of the 2008 SNA the informal sector is defined (under 2.2.2) as "businesses or people in the production process with the objective to create jobs for themselves. It comprises units that operate at a low level with little or no capital investment, on small scale. Labour is based on casual employment, personal employment or relatives that are employed in the business" and normally these activities are not captured and regulated.

[14] http://documents.worldbank.org/curated/en/311991468037132740/pdf/WPS5356.pdf [access 2018/02/21]

Definition of the illegal sector in terms of the 2008 SNA – The illegal sector is defined as the sector where illegal production takes place, "such as where sale and production of goods and services are forbidden by law, and where production that is usually legal becomes illegal when carried out by unauthorised producers. These can include the production of illegal transportation, narcotics, smuggling and services such as prostitution".

Characteristics of the informal sector in terms of the 2008 SNA - The 2008 SNA classifies a business as being informal taking into account the following characteristics (mentioned in 2.2.3): registration status, legal incorporation, size, statistical survey coverage, borderline sectors e.g. domestic workers, locality and employment terms.

Characteristics of the illegal sector in terms of the 2008 SNA – According to the 2008 SNA, illegal sector characteristics can sometimes be the same as that of the informal sector as it differs from country to country. Further characteristics include avoiding paying taxes, social contributions, not meeting certain legal standards such as minimum wages, safety regulations, weekly working hours and avoiding to meet certain administrative procedures such as completing statistical questionnaires (2008 SNA, 100-101).

In Chapter 3 the conventional framework of this study is shown. The total SA economy consists of main sectors and sub-sectors. Upon reading the relevant equations shown in the beginning of Chapter 3 it should be kept in mind that every subsector consists of formal, informal and illegal components. Based on the definitions and characteristics mentioned above, the aspects of each of these components are as follows:

- The formal sector is not calculated as it is taken directly from the statistical release P0441 (Stats SA).
- The informal sector is calculated for each sector separately and where subsectors are measured, it is mentioned in the beginning of the section in Chapter 3 to Chapter 6. The informal sector includes the small scale sector and own account enterprises.
- Illegal activities are calculated separately for each sector.

In Chapter 4 to Chapter 6 these above-mentioned calculations are seen as a six-step process. In the first step, the statistical release, P0441 (Stats SA) is disaggregate, to obtain the NOE separately from

the formal sector for the two years inconsideration namely 2011 and 2016. The second step calculates the value added for the informal sector for the respective sector. The third step involves the calculation of the value added for the illegal sector for the respective sector. The fourth step adds the informal and illegal sector together; this is seen as the NOE sector. Step 5 adds together the newly determined NOE sector calculations to the formal sector calculations in step 1. Taking into account these steps, the existing sector value added published data in statistical release, "Gross Domestic Product (GDP)", P0441 (Stat SA) is evaluated against the newly estimates of the respective sectors to determine the size of the value added over-/underestimation.

2.7 Concluding remarks

Chapter 2 mainly discusses the documentation used by national accounts to define the non-observed economy activities, informal sector and illegal activities. These guidelines and definitions are used in the chapters that follow, ensuring that national accounts of South Africa are in line with international prescribed guidelines.

CHAPTER 3: CONCEPTUAL FRAMEWORK AND METHODOLOGY UNDERPINNING THE ESTIMATION OF ESTIMATING THE SIZE OF VALUE ADDED BY NON-OBSERVED ECONOMY ACTIVITIES IN THE ALL SECTORS

3.1 Introduction

In order to meet the objectives of this study, the size of each sector is measured separately in Chapters 4 to 6. This provides an indication of which sectors are over-/underestimated. Each sector's methodology and literature in use are explained under its respective section. These sectors are discussed under different sections. This chapter includes the modelling, conventional framework and each sector's calculations of NOE.

3.2 Modelling/analytical methodology

The methodologies used in determining each sector's formal and NOE components include theory generating examinations, unrestricted informal explorations and hypothesis-based formal tests. For each industrial sector the exact methodological process for the specific industry is discussed beforehand, then subsequent to that, the data is analysed.

The total economy model is explained based on a relationship between the industrial sectors, sub-sectors and the time changing factor. The reason for including a time changing factor into the equation is to show whether the sectors' NOE grew over time and if the gap widened/narrowed over that same period. This gap is the variation between the actual calculations of the GDP and newly calculated values. The time period pertinent in this research is based on two years: the 2011 calendar year and the 2016 calendar year. The reason for these two specific years is because national accountants benchmark the National Accounts (which measures the entire economy) every 5 years. Benchmarking is defined as the rebasing of all years taking into account newly available data and new international guidelines; these are applied to the already published data series. The last benchmark performed was on the 2010 reference year.

The discussion which follows includes the total economy with references to the equation in use to determine the size of the economy.

3.3 Total economy

The total economy comprises of different sector/sectors that are classified according to the Standard industrial classification (SIC). The economy consists of an agriculture sector (SIC 1), mining and quarrying sector (SIC 2), manufacturing sector (SIC 3), electricity, gas and water supply sector (SIC 4), construction sector (SIC 5), wholesale and retail trade sector (SIC 6), transport, storage and communication sector (SIC 7), financial intermediation, insurance, real estate and business services sector (SIC 8), community, social and personal services sector (SIC 9), private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector (SIC 01). These sectors are discussed in detail in Chapters 4 to 6. The equation below indicates all the sectors in the economy and also shows the size of each sector; and therefore, the economy is shown as a dynamically changing aggregate of different sectors contributing whole changes continuously to value added in the economy over time.

$$\frac{dfE}{dt} = \frac{dfA}{dt} + \frac{dfM}{dt} + \frac{dfMa}{dt} + \frac{dfEW}{dt} + \frac{dfCon}{dt} + \frac{dfWR}{dt} + + \frac{dfTC}{dt} + \frac{dfFin}{dt} + \frac{dFCSP}{dt} + \frac{dFPOther}{dt}$$

Where:

***dE** = total economy is equal to the following sectors:*

dfA = Agriculture sector,

dfM = Mining and quarrying sector,

dfMa = Manufacturing sector,

dfEW = Electricity, gas and water supply sector,

dfCon = Construction sector,

dfWR =Wholesale and retail trade sector,

dfTC = Transport, storage and communication sector,

dfFin = Financial intermediation, insurance, real estate and business services sector,

dfCSP = Community, social and personal services sector,

dFPOther = Private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector.

dt = This indicates that the economy changes over time and that the economy is not stagnant.

Besides that, the total economy has different sectors, each sector comprises of a formal sector, informal/small scale sector and illegal/underground/grey economy activities.

The equation below indicates that the total economy consists of a continuously changing formal sector, informal/small scale sector and illegal /underground/grey economy activities as a continuously changing value added aggregate.

$$\frac{dE}{dt} = \frac{dF_{1\text{-}n}}{dt} + \frac{dI_{1\text{-}n}}{dt} + \frac{dN_{1\text{-}n}}{dt}$$

Where:

dE *= total economy; this includes all the sectors/sectors of the economy*

dF *= formal economy sector of the entire economy*

dI *= the informal/small scale sector of the entire economy*

dN *= the* illegal *underground/grey economy sector of the entire economy*

dt = This indicates that the economy changes over time and that the economy is not stagnant.

The remainder of this chapter involves the discussion of each sector and sub-sectors and the equations in use.

3.4 Sectors and sub-sectors

Although all the sub-sectors are mentioned in the below discussion, it should be noted that the limitations outlined in Chapter 1 indicated that for the research conducted for the purposes of this dissertation, there was not a focus on sub-sectors, but the study rather includes the 1-digit level sectors according to the standard industrial classification (SIC). The implication of this can potentially be that all sectors' measurements have some kind of limitations. In some sectors, sub-sectors are discussed, but the sub-sectors under discussion is mentioned in the beginning of each sub industry of the related sector.

3.4.1 Agriculture sector

The agriculture sector (SIC 1) comprises of agriculture (SIC 11), forestry (SIC 12) and fishing (SIC 13). It should be kept in mind that in this sector, subsectors also consist of formal-, informal-/ small scale-/and NOE sectors.

To determine the total value added for this sector, the following equation is being used:

$$\frac{dfA}{dt} = \frac{dfAg}{dt} + \frac{dfF1}{dt} + \frac{dfF2}{dt}$$

The equation above indicates that the total agriculture sector comprises of three subsectors namely Agriculture, Forestry and Fishing. The meaning of the symbols in the equation are as follows:

dA = Total agriculture sector comprises of the sum of all agricultural sub-sectors.

The sub-sectors of the agriculture sector are as follows and indicated in the equation above as:

dfAF = sub-sector Agriculture, hunting and relating services

dfF1 = sub-sector Forestry, logging and related services

dfF2 = sub-sector Fishing, operation of fish hatcheries and fish farms

dt = This indicates that the economy changes over time and that the economy is not stagnant.

All of these sub-sectors of the agriculture sector are added together according to the SIC classification to cover the total agriculture sector (SIC 1).

3.4.2 Mining and quarrying sector

The mining sector (SIC 2) comprises of coal mining (SIC 21); the extraction of crude petroleum and natural gas (SIC 22); gold mining (SIC 23); the mining of metal ores (SIC 24); other mining and quarrying (SIC 25); and service activities incidental to the mining of minerals (SIC 29).

To determine the total value added for this sector, the following equation is being used:

$$\frac{dfM}{dt} = \frac{dFMc}{dt} + \frac{dfMp}{dt} + \frac{dfMg}{dt}\frac{dfMc}{dt} + \frac{dfMo}{dt} + \frac{dfMq}{dt} + \frac{dfMsc}{dt}$$

Where:

dfM = Total mining sector comprises of the sum of all mining sub-sectors and is indicated in the equation above as:

dfmcF = comprises of mining of coal (SIC 21)

dfMp = Extracting of crude petroleum and natural gas

dfMg = mining of gold

dfMc = mining of gold

dfMo = mining of metal ores

dfMq = other mining and quarrying and

dfMsc = services activities incidental to mining of mineral

dt = This indicates that the economy changes over time and that the economy is not stagnant.

All these sub-sectors of the mining sector are added together according to the SIC classification to cover the total mining sector (SIC 2).

3.4.3 Manufacturing sector

The manufacturing sector (SIC 3) is the sum of manufacturing of food products, beverages and tobacco (SIC 30); manufacturing of textiles, wearing apparel, leather and related product (SIC 31); manufacturing of wood and product of wood or cork, except furniture; manufacture of articles of straw and plaiting materials, paper and paper products, printing and reproduction of recorded media (SIC 32); manufacturing of coal and refined petroleum products, pharmaceuticals, medicinal chemical and botanical products and rubber and plastic products (SIC 33); manufacturing of other non-metallic mineral products, glass and non-metallic mineral products (SIC 34); manufacturing of basic metals, fabricated metal products, basic iron and steel, non-ferrous metal, casting metals tanks, reservoirs, fabricated metal products, general purpose machinery, domestic appliances, accounting and computing machinery (SIC 35); manufacturing electrical machinery and equipment, generators, control apparatus, wire and cables, batteries, lamps, lighting equipment's and electrical equipment etc. (SIC 36); manufacturing of all radio, television and communication equipment (SIC 37); manufacturing of other transport equipment, motor vehicles, ship, boats railway, aircraft, transport equipment and, trailer and semi-trailers equipment (SIC 38); and manufacturing of furniture and recycling etc. (SIC 39).

To determine the total value added in this sector, the following equation was used:

$$\frac{dfMa}{dt} = \frac{dfMaf}{dt} + \frac{dfMat}{dt} + \frac{dfMaw}{dt} + \frac{dfMac}{dt} + \frac{dfManon}{dt} + \frac{dfMabm}{dt} + \frac{dfMaem}{dt} + \frac{dfMart}{dt} + \frac{dfMatm}{dt} + \frac{dfMafr}{dt}$$

Where:

dfMa = total manufacturing sector comprises of the sum of all manufacturing sub-sectors and is indicated in the equation above as:

The sub-sectors of the manufacturing sector are as follows:

dfMaf = manufacturing of food products, beverages and tobacco

dtMat = manufacturing of textiles, wearing apparel, leather and related product

dfMaw = manufacturing of wood and product of wood or cork, except furniture; manufacturing of articles of straw and plaiting materials, paper and paper products, printing and reproduction of recorded media

dfMac = manufacturing of coal and refined petroleum products, pharmaceuticals, medicinal chemical and botanical products and rubber and plastic products

dfManon= manufacturing of other non-metallic mineral products, glass and non-metallic mineral products

dfMabm = manufacturing of basic metals, fabricated metal products, basic iron and steel, non-ferrous metal, casting metals tanks, reservoirs, fabricated metal products, general purpose machinery, domestic appliances, accounting and computing machinery

dfmaem = manufacturing electrical machinery and equipment, generators, control apparatus, wire and cables, batteries, lamps, lighting equipment's and electrical equipment etc.

dfMart = manufacturing of all radio, television and communication equipment

dfMtm = manufacturing of other transport equipment, motor vehicles, ship, boats railway, aircraft, transport equipment and, trailer and semi-trailers equipment

dfMafr = manufacturing of furniture and recycling etc.

dt = This indicates that the economy changes over time and that the economy is not stagnant.

All these sub-sectors of the manufacturing sector are added together according to the SIC classification to cover the total manufacturing sector (SIC 3).

3.4.4 Electricity, gas and water supply sector

The electricity, gas and water supply sector (SIC 4) is the sum of electricity, gas, steam and hot water supply, production, collection and distribution of electricity, manufacturing of gas and distribution of and hot water supply (SIC 41) and the collection, purification and distribution of water (SIC 42).

To determine the size of value added of this sector the following formula is being used:

$$\frac{dfEW}{dt} = \frac{dfEWegw}{dt} + \frac{dfEWcpw}{dt}$$

Where:

dfEW = total electricity and water sector comprises of the sum of all electricity and water sub-sectors and is indicated in the equation above as:

The sub-sectors of the electricity and water sector/sector is as follow:

dfEWegw = electricity, gas, steam and hot water supply, production, collection and distribution of electricity, manufacturing of gas and distribution of and hot water supply

dfEWcpw = Collection, purification and distribution of water

dt = This indicates that the economy changes over time and that the economy is not stagnant.

All these sub-sectors of the electricity and water sector are added together according to the SIC classification to cover the total electricity and water sector (SIC 4).

3.4.5 Construction sector

The construction sector (SIC 5) is not being discussed at a 3-digit level where 3-digit levels refer to sub-sub-sector. The sub-sectors of the construction sector include construction, site preparation, and building of complete construction, civil engineering, building installations, building completions and renting of construction equipment.

To determine the total value added for this sector, the following equation is being used:

$$\frac{dfCon}{dt} = \frac{dfCon}{dt}$$

Where:

dfCon = total construction sector is shown formula above. No sub-sectors are discussed in this section.

dt = This indicates that the economy changes over time and that the economy is not stagnant.

3.4.6 Wholesale and retail trade sector

The wholesale and retail trade sector (SIC 6) is the sum of the wholesale and commission trade, trade on fees or contract/commission basis, trade in agriculture , non-agricultural, raw material, machinery and other trade (SIC 61); retail trade, non-specialised retail trade, retail trade of food beverage and tobacco products, trade of new good, second hand goods, personal and household goods (SIC 62); sale, maintenance and repairs of vehicles, motor cycles and the retail in automotive fuel (SIC 63); hotels and restaurants that includes camping sites short-stay accommodation, restaurants and bars (SIC 64).

To determine the total value added for this sector, the following equation is being used:

$$\frac{dfWR}{dt} = \frac{dfWRcar}{dt} + \frac{dfWRft}{dt} + \frac{dfWRvc}{dt} + \frac{dfWRhr}{dt}$$

Where:

dfWR *= total w*holesale and retail trade *sector comprises of the sum of all w*holesale and retail trade *sub-sectors and is indicated in the equation above as:*

dfWRcar = wholesale and commission trade, trade on fees or contract/commission basis, trade in agriculture, non-agricultural, raw material, machinery and other trade (SIC 61)

dtWRft = retail trade, non-specialised retail trade, retail trade of food beverage and tobacco products, trade of new good, second hand goods, personal and household goods (SIC 62)

dfWRvc = sale, maintenance and repairs of vehicles, motor cycles and the retail in automotive fuel (SIC 63)

dfWRhr = hotels and restaurants that includes camping sites short-stay accommodation, restaurants and bars (SIC 64)

dt = This indicates that the economy changes over time and that the economy is not stagnant.

All these sub-sectors of the wholesale and retail sector are added together according to the SIC classification to cover the total wholesale and retail sector (SIC 6).

3.4.7 Transport, storage and communication sector

The transport, storage and communication sector (SIC 7) is the sum of land transport via pipelines, railway-, other land-, via pipelines transport (SIC 71); water transport, sea and coastal, inland transport (SIC 72); air transport (SIC 73); supporting and auxiliary transport activities and activities of travel agencies (SIC 74); and post and telecommunication (SIC 75).

To determine the total value added for this sector, the following equation is being used:

$$\frac{dfTC}{dt} = \frac{dfTClp}{dt} + \frac{dfTCwsct}{dt} + \frac{dfTCair}{dt} + \frac{dfTCwctr}{dt} + \frac{dfTCpt}{dt}$$

Where:

dfTC = total transport, storage and communication sector comprises of the sum of all transport, storage and communication sub-sectors and is indicated in the equation above as:

dfTClp = land transport vis pipelines, railway-, other land-, via pipelines transport (SIC 71)

dfTCwsct = water transport, sea and coastal, inland transport (SIC 72)

dfTCair = air transport (SIC 73)

dfTCwctr =supporting and auxiliary transport activities and activities of travel agencies (SIC 74)

dfTCpt = post and telecommunication (SIC 75)

dt = This indicates that the economy changes over time and that the economy is not stagnant.

All these sub-sectors of the transport, storage and communication sector are added together according to the SIC classification to cover the total transport, storage and communication sector (SIC 7).

3.4.8 Financial intermediation, insurance, real estate and business services sector

The financial intermediation, insurance, real estate and business services (SIC 8) is the sum of financial intermediation, monetary intermediation and other financial intermediation n.e.c. (SIC 81); insurance and pension funding (SIC 82) activities auxiliary to financial intermediation (SIC 83); real estate (SIC 84); renting of machinery, - transport equipment, - personnel and - household goods (SIC 85); computer and related activities (SIC 86); research and development (SIC 87); and other business (SIC 88).

To determine the total value added for this sector, the following equation is being used:

$$\frac{dfFin}{dt} = \frac{dfFinIMF}{dt} + \frac{dfFinIP}{dt} + \frac{dfFinAF}{dt} + \frac{dfFinRE}{dt} + \frac{dfFinRent}{dt} + \frac{dfFinR\&D}{dt} + \frac{dfFinComp}{dt} + \frac{dfFinOther}{dt}$$

Where:

dfFin = financial intermediation, insurance, real estate and business services (SIC 8) *sub-sectors and is indicated in the equation above as:*

dfFinIMF = financial intermediation, monetary intermediation and other financial intermediation n.e.c.

dfFinIP = insurance and pension funding (SIC 82)

dfFinAF = activities auxiliary to financial intermediation (SIC 83)

dfFinRE = real estate (SIC 84)

dfFinRent = renting of machinery, - transport equipment, - personnel and - household goods (SIC 85)

dfFinComp = renting of machinery, - transport equipment, - personnel and - household goods (SIC 85), computer and related activities

dfFinR&D = research and development (SIC 87)

dfFinOther = other business (SIC 88)

dt = This indicates that the economy changes over time and that the economy is not stagnant.

All these sub-sectors of the financial intermediation, insurance, real estate and business services sector added together according to the SIC classification to cover the entire financial intermediation, insurance, real estate and business services (SIC 8) also known as FISIM.

3.4.9 Community, social and personal services sector

The community, social and personal services sector (SIC 9) is the sum of public administration, national government, provincial government and local government (SIC 91); education and other education services (SIC 92); health and social work (SIC 93); sewerage, refuse, sanitation and similar activities (SIC 94); activities of membership organisation (SIC 95) recreational, cultural and sporting activities (SIC 96); and other services (SIC 99).

To determine the total value added for this sector, the following equation is being used:

$$\frac{dfCsp}{dt} = \frac{dfCspPpnl}{dt} + \frac{dfCspE}{dt} + \frac{dfCspH}{dt} + \frac{dfCspS}{dt} + \frac{dfCspM}{dt} + \frac{dfCspR}{dt} + \frac{dfCspOther}{dt}$$

Where:

dfCsp = community, social and personal services sector (SIC 9) *sub-sectors and is indicated in the equation above as:*

dfCspPpnl = public administration, national government, provincial government and local government (SIC 91)

dfCspPE = education and other education services (SIC 92)

dfCspH = health and social work (SIC 93)

dfCspS = sewerage, refuse, sanitation and similar activities (SIC 94)

dfCspM = renting of machinery, - transport equipment, - personnel and - household goods (SIC 85)

dfCspR = recreational, cultural and sporting activities (SIC 96)

dfCspOther = and other services (SIC 99)

dt = This indicates that the economy changes over time and that the economy is not stagnant.

All these sub-sectors of the community, social and personal services sector added together according to the SIC classification to cover the entire community, social and personal services sector.

3.4.10 Sector of Private household's exterritorial organisations, representatives of foreign government and other activities not adequately defined

The private household's exterritorial organisations, representatives of foreign government and other activities not adequately defined sector (SIC 01) is the sum of private households with employed persons, exterritorial organisations (SIC 02), representatives of foreign government (Sic 03), other activities not adequately defined (SIC 09).

To determine the total value added for this sector, the following equation is being used:

$$\frac{dfP}{dt} = \frac{dfPf}{dt} + \frac{dfPe}{dt} + \frac{dfPfg}{dt} + \frac{dfPother}{dt}$$

Where:

dfP = Private household's exterritorial organisations, representatives of foreign government and other activities not adequately defined (SIC 01) *sub-sectors and is indicated in the equation above as:*

dfPf = Private household with employed persons (SIC 01000)

dfPe = Exterritorial organisations (SIC 02000)

dfPfg = Representatives of foreign governments (SIC 03000)

dfPother = Other activities not adequately defined (SIC 09000)

dt = This indicates that the economy changes over time and that the economy is not stagnant.

All these sub-sectors of the private household's exterritorial organisations, representatives of foreign government and other activities not adequately defined.

Taking all these subsectors of each sector into consideration, it should be noted that these sub-sectors exist of formal sector, informal/small scale sector and non-observed/grey/underground sector.

3.5 All sectors formal sector informal/small scale sector and illegal/underground/grey economy sector

Taking the above sections (section 1 and section 2) into consideration, the sectors and sub-sectors comprises of formal sector, informal/small scale sector and non-observed/grey/underground sector. These sectors are explained below.

3.5.1 Agriculture sector

The equation below indicates that the agriculture sector includes the informal/small scale sector and non-observed/grey/underground sector as mentioned above under 2.1 of this chapter.

$$\frac{dfA}{dt} = \frac{dfAgric}{dt} + \frac{dIAgric}{dt} + \frac{dNAgric}{dt}$$

Where:

dfA = This is the total agriculture sector

dfAgric = Formal agriculture sector

dIAgric =Informal/small-scale agriculture sector

dNAgric = illegal/grey/underground agriculture sector activities

dt = This indicates that the economy changes over time and that the economy is not stagnant.

3.5.2 Mining sector

The equation below indicates that the mining sector includes the informal/small scale sector and non-observed/grey/underground sector as mentioned above under 2.1 of this chapter.

$$\frac{dfM}{dt} = \frac{dfMining}{dt} + \frac{dIMining}{dt} + \frac{dNMining}{dt}$$

Where:

dfM = This is the total mining sector

dfMining = Formal mining sector

dIMining = Informal/small-scale mining sector

dNMining = illegal/grey/underground mining sector activities

dt = This indicates that the economy changes over time and that the economy is not stagnant.

3.5.3 Manufacturing sector

The equation below indicates that the manufacturing sector includes the informal/small scale sector and non-observed/grey/underground sector as mentioned above under 2.1 of this chapter.

$$\frac{dfMa}{dt} = \frac{dfManufact}{dt} + \frac{dIManufact}{dt} + \frac{dNManufact}{dt}$$

Where:

dfMa = This is the total manufacturing sector

dfManufact = Formal manufacturing sector

dIManufact = Informal/small-scale manufacturing sector

dNManufact = illegal/grey/underground manufacturing sector activities

dt = This indicates that the economy changes over time and that the economy is not stagnant.

3.5.4 Electricity, gas, steam and hot water sector

The equation below indicates that the electricity, gas, steam and hot water sector includes the informal/small scale sector and non-observed/grey/underground sector as mentioned above under 2.1 of this chapter.

$$\frac{dfEW}{dt} = \frac{dfElect\&water}{dt} + \frac{dIElect\&water}{dt} + \frac{dNElect\&water}{dt}$$

Where:

dfEW = This is the total electricity, gas, steam and hot water sector

dfElect&water = Formal electricity, gas, steam and hot water sector

dIElect&water = Informal/small-scale electricity, gas, steam and hot water sector

dNElect&water = illegal/grey/underground electricity, gas, steam and hot water sector activities

dt = This indicates that the economy changes over time and that the economy is not stagnant.

3.5.5 Construction sector

The equation below indicates that the construction sector includes the informal/small scale sector and non-observed/grey/underground sector as mentioned above under 2.1 of this chapter.

$$\frac{dfCon}{dt} = \frac{dfContt}{dt} + \frac{dIContt}{dt} + \frac{dNContt}{dt}$$

Where:

dfCon = This is the total construction sector

dfCont = Formal construction sector

dICont = Informal/small-scale construction sector

dNCont = illegal/grey/underground construction sector activities

dt = This indicates that the economy changes over time and that the economy is not stagnant.

3.5.6 Wholesale and retail sector

The equation below indicates that the wholesale and retail sector includes the informal/small scale sector and non-observed/grey/underground sector as mentioned above under 2.1 of this chapter.

$$\frac{dfWR}{dt} = \frac{dfW\&R}{dt} + \frac{dIW\&R}{dt} + \frac{dNW\&R}{dt}$$

Where:

dfWR= This is the total wholesale and retail sector

dfW&R= Formal wholesale and retail sector

dIW&R=Informal/small-scale wholesale and retail sector

dNW&R= illegal/grey/underground wholesale and retail sector activities

dt = This indicates that the economy changes over time and that the economy is not stagnant.

3.5.7 Transport, storage and communication sector

The equation below indicates that the transport, storage and communication sector includes the informal/small scale sector and non-observed/grey/underground sector as mentioned above under 2.1 of this chapter.

$$\frac{dfTC}{dt} = \frac{dfTSC}{dt} + \frac{dITSC}{dt} + \frac{dNTSC}{dt}$$

Where:

dfTC= This is the total transport, storage and communication sector

dfTSC = Formal transport, storage and communication sector

dITSC = Informal/small-scale transport, storage and communication sector

dNTS C= illegal/grey/underground transport, storage and communication sector activities

dt = This indicates that the economy changes over time and that the economy is not stagnant.

3.5.8 Financial, intermediation, insurance, real estate and business services sector

The equation below indicates that the financial, intermediation, insurance, real estate and business services sector includes the informal/small scale sector and non-observed/grey/underground sector as mentioned above under 2.1 of this chapter.

$$\frac{dfFIN}{dt} = \frac{dfFIR}{dt} + \frac{dIFIR}{dt} + \frac{dNFIR}{dt}$$

Where:

dfFIN = This is the total financial, intermediation, insurance, real estate and business services sector

dfFIR = Formal financial, intermediation, insurance, real estate and business services sector

dIFIR = Informal/small-scale financial, intermediation, insurance, real estate and business services sector

dNFIR = illegal/grey/underground financial, intermediation, insurance, real estate and business services sector activities

dt = This indicates that the economy changes over time and that the economy is not stagnant.

3.5.9 Community, social and personal services sector

The equation below indicates that the community, social and personal services sector includes the informal/small scale sector and non-observed/grey/underground sector as mentioned above under 2.1 of this chapter.

$$\frac{dfCSP}{dt} = \frac{dfCFSP}{dt} + \frac{dICSP}{dt} + \frac{dNCSP}{dt}$$

Where:

dfCSP = This is the total community, social and personal services sector

dfCFSP = Formal community, social and personal services sector

dICSP = Informal/small-scale community, social and personal services sector

dNCSP = illegal/grey/underground community, social and personal services sector activities

3.5.10 Private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector

The equation below indicates that the private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector includes the informal/small scale sector and non-observed/grey/underground sector as mentioned above under 2.1 of this chapter.

$$\frac{dFPOther}{dt} = \frac{dPOthereF}{dt} + \frac{dIPOther}{dt} + \frac{dNPOther}{dt}$$

Where:

dFPOther = This is the total private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector

dPOtherF = Formal private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector

dIPOther = Informal/small-scale private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector

dNPOther = illegal/grey/underground private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector activities

dt = This indicates that the economy changes over time and that the economy is not stagnant.

As indicated in the conceptual framework above, the following sectors exist in the economy according to the Standard Industrial Classification (SIC), and these are measured separately:

1. Agriculture (SIC 1)

Section A discusses the agriculture sector, which consists of agriculture, fishing and forestry. Although the research focuses on the sector only, it is difficult not to discuss these subsectors separately. All these subsectors are discussed in formal sector, informal sector, small-scale sector and illegal activities. The conclusion discusses the findings against the existing published data.

2. Mining and quarrying (SIC 2)

The discussion in Section B includes the mining sector. The mining sector consists of formal mining, informal mining/small-scale mining and illegal mining activities. The mining sector is discussed on one-digit level (as indicated in the objectives), although shortcomings in the data are expected because of non-reporting of all precious metals. The conclusion indicates the outcome of the findings and reveals whether this sector is under-/overestimated, taking into account all parameters.

3. Manufacturing (SIC 3)

The discussion in Section C includes the manufacturing sector. This sector consists of formal manufacturing, informal sector, small-scale manufacturing and illegal manufacturing activities. The manufacturing sector is discussed on one-digit level (as indicated in the objectives). The last point in this section concludes with the findings of under-/overestimation.

4. Electricity, gas and water (SIC 4)

The discussion in Section D includes the electricity and water sector. This sector consists of formal sector, informal sector, small-scale sector and illegal activities. The electricity and water sector is discussed on a two-digit level, as it is difficult to discuss both of these sectors as equal sectors because it differs in its kind of activity. The last point in this section concludes with the findings of under-/overestimation.

5. Construction (SIC 5)

The discussion in Section E includes the construction sector. This sector consists of formal sector, informal sector, small-scale sector and illegal activities. The construction sector is discussed on one-digit level, as indicated in the objectives. The last point in this section concludes with the findings of under-/overestimation.

6. Wholesale and retail trade (SIC 6)

The discussion in Section F includes the wholesale, retail and trade sector. This sector consists of formal sector, informal sector, small-scale sector and illegal activities. This sector is discussed on one-digit level, as indicated in the objectives. The last point in this section concludes with the findings of under-/overestimation.

7. Transport, storage and communication (SIC 7)

The discussion in Section G includes the transport sector. This sector consists of formal sector, informal sector, small-scale sector and illegal activities. The transport sector is discussed on one-digit level, as indicated in the objectives. The last point in this section concludes with the findings of under-/overestimation.

8. Financial intermediation, insurance and real estate (SIC 8)

The discussion in Section H includes the financial intermediation, insurance and real estate sector. This sector consists of formal sector, informal sector, small-scale sector and illegal activities. The Financial intermediation, insurance and real estate sector is discussed on one-digit level, as indicated in the objectives. The last point in this section concludes with the findings of under-/overestimation.

9. Community, social and personal services and Activities of private households (SIC 9)

The discussion in Section I includes the other service activities by households. This sector consists of formal sector, informal sector, own account and illegal activities. This sector is discussed on one-digit level, as indicated in the objectives. The last point in this section concludes with the findings of under-/overestimation.

3.6 Concluding remarks

The above sectors form the basis of the discussion in Chapter 4 to Chapter 6. The sectors are split into the primary sector (Chapter 4), followed by the secondary sector (Chapter 5) and lastly the tertiary sector (Chapter 6).

Chapter 4 discusses the primary sector. The primary sector harvests or extracts products from the ground. In this dissertation it includes the agriculture sector (SIC 1) and the mining sector (SIC 2). Chapter 5 discusses the secondary sector/activities. The secondary sector is defined as the part of the economy that produces (manufactures) goods: therefore including the manufacturing sector (SIC 3), electricity and water sector (SIC 4) and the construction sector (SIC 5). Chapter 6 discusses the tertiary sector/activities. This sector consists of the services part of the economy. The tertiary sector provides a service to businesses and to the population. Tertiary activities include the wholesale and retail sector (SIC 6), transport sector (SIC 7), financial services sector (SIC 8), public administration (SIC 9) and other services (SIC 01).

CHAPTER 4: ESTIMATING THE VALUE ADDED SIZE OF NOE ACTIVITIES IN THE PRIMARY SECTORS

4.1 Background

In terms of the research problem formulated for the purposes of this study and the conceptual framework shown above, the question to answer is if the various economic sectors' sizes are fully accounted for in GDP keeping in mind possible over/underestimation of NOE activities. The outline of the different sectors consists of current estimations. The current estimates form the base of the analysis against which new estimates are evaluated. The new estimates consist of estimates that are calculated by taking all research questions into consideration to compare the new estimates to the current estimates. This will determine the over-/underestimation of the various primary sectors.

4.2 Measuring the size of NOE activities in the agricultural sector

In order to determine the current size of the agricultural sector, the international guideline, the Standard Industrial Classification (SIC), is taken into account. It should be noted that this sector, as mentioned in Chapter 3, consists of the formal agricultural and agricultural NOE sectors. According to the Standard Industrial Classification, the agriculture sector comprises agriculture, hunting and related services (SIC 11), forestry, logging and related services (SIC 12), and fishing, operation of fish hatcheries and fish farms (SIC 13). Using the following formula to determine the agriculture sector:

SIC 1 = Agriculture (Formal agriculture sector + Small-scale agriculture activities + informal agriculture sector + Illegal sector)

+ Forestry (Formal forestry sector + informal forestry sector + Illegal forestry sector)

+ Fishery (Formal fishery sector + informal fishery sector + Illegal fishery sector)

Taking the size of the agriculture sector formula into consideration, the existing estimates for the agricultural sector are obtained from two statistical releases. Firstly, in Statistics South Africa Release No. P0441, "*Gross domestic product (GDP) 1st quarter 2016*", the table in use is GDP annual and regional table 2016, worksheet "SUT 2011"; this represents a 10 x 10 supply and use table. Secondly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP)" 4th quarter 2014*", the table in use is tables 4th quarter 2014.xls, worksheet "Use table 2011"; this represents a 64 x 105 supply and use table.

The difference between the two tables is firstly, that the 10 x 10 use table is merely a condensed version of the 64 x 105 use table. Secondly, the 10 x 10 use table includes the informal sector, small-scale agricultural sector and illegal activities ***as part*** of the agricultural sector, whereas the 64 x 105 use table shows the informal sector, small-scale agriculture sector and illegal activities of all the sectors as ***one column*** in the statistical release. The assumption is made that the difference between the two tables by sector represents the informal sector, own accounts sector and illegal activities.

Before determining the estimates of the 2011 calendar year, the 64 x 105 use table needs to be condensed to reflect a 10 x 10 use table as well. This allows the researcher to determine the difference between the two tables, the 101 x 10 and 64_105, thus, to calculate the informal agriculture sector, small-scale agriculture sector and illegal agriculture activities separately for each sector. The reason for subtracting the two tables from each other is that the 10 x 10 SUT shows all sectors including the informal, small-scale and NOE activities as part of the sector, whereas in the 64 X 105 informal, small-scale and NOE activities are shown separately. Therefore, by subtracting the two tables, the informal sector, small-scale sector and NOE activities are determined by sector separately. This allows the researcher to measure if the informal sector, small-scale sector and NOE activities are under-/overestimated. Determining the 2011 SIC 1 informal sector, small-scale sector and NOE activities involves a couple of steps.

Firstly, a problem exists when comparing the two tables, 10 x 10 use table (published 2016) and – after condensing – the 64 x 105 use table (published 2014) to a 10 x 10 use table. It is notable that the two tables differ in IC, value added and output. The reason for this is that the 10 x 10 use table was revised in 2016, although it is not mentioned which sector was revised. To accommodate for this revision of the 10 x 10 use table (2016) intermediate consumption, value added and output, the 64 x 105 use table (2014) is revised and compressed to a 10 x 10 use table. The assumption is made that the revision is added to the informal agriculture sector, illegal agriculture sector and own account agriculture sector.

The second step is to determine whether the difference between the two tables represents the informal agriculture sector, illegal agriculture sector and own account agriculture sector, e.g. the difference of revised 10 x 10 supply and use table published P0441 GDP 1st quarter (2016) value added is R69 105 million, whereas the 64 x 105 use table is condensed to a 10 x 10 table value added

R68 477 million, equals to the R628 million. This amount reflects the current estimations for the 2011 informal agriculture sector, illegal agriculture sector and own account agriculture sector.

Table 4.1: Non-observed sector for agriculture sector for 2011 year (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Translated 64 x 105 translate in 10 x 10 use table (2014)	Agriculture NOE sector
Intermediate consumption	101 632	101 334	299
Total gross value added	69 105	68 477	628
Total output at basic prices	170 737	169 811	926

Source: Statistics South Africa (release no. P0441 4th quarter2014)

Table 4.1 reflects the portion that is allocated to the agriculture sector NOE sector, thus the intermediate consumption (IC) is calculated by taking the 2016 revised use table minus the 2014 condensed 10 x 10 table. Determining 2011, the intermediate consumption reflects R299 million, value added (R628 million) and output (R926 million). This current agriculture informal, small and NOE activities intermediate consumption, value added and output data is compared under point 3.1 with the new estimates for 2011.

The following section determines the 2016 agriculture informal, small and illegal activities intermediate consumption, value added and output. A release by Statistics South Africa is taken into account, namely Release No. P0441, "*Gross domestic product (GDP) 4th quarter 2017*", Annual, quarterly and regional fourth quarter 2017.xls tables are used, worksheet "SUT 2016"; this represents a 10 x 10 use table and worksheet "use table 2016 (64_105)" that represents the larger use table. The 2016 data is not revised; thus, the two releases are used as is. The 64 x 105 use table is just condensed to a 10 x 10 use table. The difference between the two 10 x 10 use tables is determined by obtaining the portion that is allocated to the SIC 1 informal sector, own account sector and illegal activities sector, see table below.

Table 4.2: Non-observed sector for agriculture sector for 2016 year (R' million)

	Use table 10 x 10 published P0441 GDP 1st quarter 2016	Supply and use table 64 x 105 condensed to 10 x 10 use table	Difference between two tables reflects the agriculture NOE sector
Intermediate consumption	142 333	142 307	26
Total gross value added	94 756	94 418	338
Total output at basic prices	237 090	236 725	365

Source: Statistics South Africa (release no. P0441, 4th quarter 2017)

Table 4.2 represents the 2016 data that is allocated to the informal agriculture sector, small-scale agriculture sector and illegal agriculture activities. This current agriculture informal, small and NOE activities intermediate consumption, value added and output data is compared under point 3.1 with the new estimates of the informal agriculture sector, small-scale agriculture sector and the illegal agriculture activities for 2016.

The following section represents the new calculation of the informal agriculture sector, small-scale agriculture sector and the illegal agriculture activities for the reference years 2011 and 2016.

4.2.1 New calculations of the agriculture sector informal and illegal activities (SIC 1)

The main objective of the agriculture sector is to ensure food security for, and economic development of, the population. According to WWF-SA: 3, *Agriculture: Facts & Trends South Africa*, food security is becoming more important, thus the role that small-scale farmers/subsistence farmers play is significant to ensure food security – even if it is only for own and private use. South Africa's NOE agriculture comprises three main categories, namely subsistence farmers, informal farmers and illegal farmers. Subsistence farming is farming undertaken by ordinary people who grow crops and raise livestock for own and final use. It does not refer to the size of the land, but to the farmers who produce food for themselves for food security. Informal farmers are seen as farmers who trade in agricultural products as a source of income, such as the selling of livestock, vegetables, etc. Illegal farming is seen as farmers who are involved in underground activities that are normally hidden, but who still receive an income from production, such as cannabis and illegal trading in hunting, e.g. poaching.

4.2.1.1 Methodology

The methodology that follows is based on Chapter 3. Three types of farming is discussed namely informal agriculture/small scale agriculture, agriculture for own and final use and illegal agriculture. To determine these agricultural sectors, the number of households engaged in the agriculture sector are used together with the price of specific agricultural products. The calculations in use to determine these sectors follow and explained.

The number of households that are involved in farming activities is taken from the Statistics South Africa report, *Community Survey 2016 Agricultural households*, (Report No. 03-01-05, Statistics South Africa, 2016) and Release No. P0318, *General household survey 2017* (Statistics South Africa, 2017).

The price of specific agricultural products is obtained from the DAFF publication, *Abstract of Agricultural Statistics 2017* (DAFF, 2017).

4.2.1.2 Farmers producing for own use

According to the 2008 SNA, some sectors consist of own-account production, and the agriculture sector is one of these sectors. It indicates that not all income is in cash, namely it can be a non-monetary transaction such as production for own consumption, a barter transaction or in-kind remuneration. For non-monetary production (2008 SNA: 463) it is suggested that household surveys are a way to measure the production cost, although limitations exist because households are reluctant to declare all own-account production, income and expenditure. The production of own products is seen as the output, whereas the intermediate consumption is the cost to produce the market product. Intermediate consumption cannot be totally seen at market cost when taking into account the characteristics of the own-account and informal sector. According to the OECD document, *Measurement of Output, Value Added, GDP in Canada and the Unites States: Similarities and Differences* (OECD, 2003:6), it is clear that it is not always possible to measure own-account production, e.g. measuring child care by families and cooking for own households. Furthermore, it refers to the "value of free labour provided by the households for own-account construction";[15] thus, the same assumption is made for own-account work in other sectors, which is that labour does not form part of intermediate cost. Output is determined by the sales cost at the gate, whereas intermediate consumption is calculated at basic prices of similar products produced in the markets (2008 SNA: 185), although own production cost is borne by the producers themselves.

Taking this methodology into consideration, the output is measured at what the producer receives when selling the product at the gate, and no intermediate consumption is taken into account.

Agriculture own production – To determine the size of own production with regard to agriculture products is based on household survey data. According to Statistics South Africa Release No. P0318:6, *General household survey 2017* (Statistics South Africa, 2017), 14,3% of households were involved in agriculture activities – 2 098 households were involved in 2011 and 2 466 households were involved in 2016. To measure own-account production, the following assumptions are taken into account:

[15]OECD document (2003:6), *Measurement of Output, Value Added, GDP in Canada and the United States: Similarities and Differences.*

1. Most indigent households will produce for own use. According to the Statistics South Africa report, *Community Survey: Agricultural Households* (Report No. 03-01-05:2, 2016), 2,9 million people were involved in agriculture in 2011, and 2,3 million were involved in 2016.

2. According to the General Household Survey 2016, the average household size is 3,3[16] members per household. The output of agriculture for own consumption is measured against the poverty line, because the poverty line determines what amount is needed to purchase the basic food requirements needed by a person.

3. Households that live below the poverty line, which equals a total income of R441[17] (poverty line) x 3,3 (number of members in household) = R1 455,30 per household.

4. Households involved in the agriculture sector are producing for own use and to ensure food security.

Taking the above into consideration, the total production for own and final use is also seen as the value added, because output minus intermediate consumption equals value added. No intermediate consumption is taken into account because more often than not, the seeds harvested from the previous year are used to plant crops for the next year. As far as labour is concerned, the OECD document, *Measurement of Output, Value Added, GDP in Canada and the United States: Similarities and Differences* (OECD, 2003:6) is taken into account – as mentioned above.

Table 4.3: Output and value added for agricultural activities, indigent households (R' million)

	2011	2016
Number of indigent households[18]	2 879 638	2 329 043
Poverty line per household	1 443[19]	1 443
Total agriculture produced for own use (output) (R' million)	4 157[20]	3 362[21]

*Source: Statistics South Africa (*Report No. 03-01-05:2, 2016)

Table 4.3 covers only indigent households and excludes all commercial farmers that produce for own and final use; thus the likelihood exists that this amount is totally underestimated as commercial

[16] P0318 – General Household Survey (GHS), 2016.
[17] The lowest level of poverty. Poverty consists of 3 levels.
[18]This data is also reflected in Community Survey 2016: Agricultural Households (Report 03-01-05).
[19] Note that household size according to the GHS is 3,3 (people in household). In order to calculate the Rand value, the number of members (3,3) was multiplied with the poverty line (R441), which equals R1 443,5. The assumption is made that most of indigent household live close to the poverty line.
[20] Data is provided in R' million for calculation purposes.
[21] Data is provided in R' million for calculation purposes.

farmers also produce for own use, e.g. they can have a small garden from which they produce onions, beans, carrots, fruits, etc., or they could keep a portion of their harvest of grain and/or maize for themselves for own use. Whatever the case may be, this output is not measured. Only formal statistics published by Statistics South Africa are taken into account. Informal statistics such as statistics produced by Agri SA, etc. are not considered, because a census on the agriculture sector was last done in 2007.

One might argue that by using the methodology of indigent households, the value of output is overestimated. According to Meier et al. (2005:28), a person needs $1 per day to survive and to provide for basic nutrition. When one considers the conversion rate, poor citizens in South Africa needed R8,12 per day in 2011 and R13,62 per day in 2016 to survive. If this is to be translated into own food consumption, the output amounts to R28 164 million (2011) and R38 208 million (2016). The output is calculated taking 2 879 million households, multiplied by 3,3 (number of people per household) multiplied by 365 (number of days) multiplied by R8,12 ($1 converted into rand for 2011). For 2016, the calculation would be 2 329 million households multiplied by 3,3 (number of members per household) multiplied by 365 (number of days) multiplied by R13,62 (conversion from $1 to rand in 2016). Taking these calculations into consideration and according to the WHO guidelines, the figures in Table 4.3 provide evidence that the value of output is totally underestimated.

Measuring livestock for own use (informal activity) – Livestock produced for own use by agricultural farmers is defined according to the 2008 SNA:185. The definition makes it clear that consumption of products must be valued at market price and included in the national accounts at market prices. Furthermore, the 2008 SNA: 479 indicates that small-scale businesses include all enterprises that do not have a full set of financial accounts. This definition of small-scale farmers is in line with the 2008 SNA and the Statistics South Africa report, *Community Survey 2016: Agricultural households* (Statistics South Africa Report No. 03-01-05, 2016).

When it comes to measuring livestock production, the assumption is made that all farmers that own fewer than 10 livestock are producing for themselves. According to Statistics South Africa Release No. P1101 (2016:19), livestock is defined as all cattle, sheep, goats, pigs, poultry and rabbits. Small-scale farmers involved in livestock production are seen as being part of informal farming activity.

According to the Statistics South Africa publication, *Community Survey: Agricultural Households (2016)*, the number of livestock owned by informal and small-scale farmers are as follows: cattle (366 000), sheep (28 000), goats (317 000), and pigs (156 000).

The price of livestock is the price against which it is selling in the market for that specific year. As mentioned previously, according to the 2008 SNA:185, when producers keep products for themselves, the value should be estimated as the same cost at which it is being sold at market, and that the cost is borne by the farmers themselves; thus, there is no intermediate cost (IC).

Output is valued at the market price that livestock is selling for. The assumption is made that farmers slaughter adult livestock, since people do not slaughter calves. Prices of all livestock and weight of livestock are obtained from DAFF (2017:56-70), *Abstract of Agricultural Statistics*.

To determine the output of livestock for own use, the quantity of livestock is multiplied by the price of that specific year (in this case 2011 and 2016), multiplied by the average weight of the livestock. Value added is output minus intermediate consumption. Output equals the value added, as no intermediate consumption is involved.

Table 4.4: Measurement of livestock for own and final use[22]

Type of meat	Quantity	Average price per kg slaughtered in Rands[23]		Average kg per livestock	Total output and value added (R' million)	
		2011	2016		2011	2016
Cattle	366 000	40	85	366,80	5 370	11 411
Sheep	88 000	80	120	25,30	246	370
Goats	317 000	70	90	25,30	561	722
Pigs	156 000	40	70	52,00	324	568
Total output					6 502	13 070

Source: Department of Agriculture, Fishing and Forestry: Abstract of Agricultural Statistics, 2016

When this methodology is taken into consideration, the view is still that this amount is underestimated. The reason for this is that production for own use of fish, chickens, ostriches and all by-products such as eggs, butter, cream, milk, etc. is not taken into account when measuring the

[22] All data in table is obtained from DAFF *Abstract of Agricultural Statistics 2016*, pages 59–68.
[23] Price obtained from DAFF *Abstract of Agricultural Statistics, 2016*.

output. There are severe limitations when trying to determine this type of production, because data is not available by product and no published data by DAFF or Statistics South Africa is available.

A further portion that needs to be added to the agriculture sector is the informal sector. The reason why the informal sector is included, is stipulated in the 2008 SNA, which states that when a transaction takes place between two parties, it must be recorded.

4.2.1.3 Informal agriculture sector

Informal farming – The 2008 SNA: 51 indicates that small-scale farmers sell from the "gate" of the farm. This cost is normally lower than the prices asked at the market, because no additional cost, e.g. transport, is involved. The production cost is valued when goods are produced and consumed. The OECD publication is used as guideline to calculate the informal sector and illegal activities.

In an effort to explain the methodology, two publications are used. First, the Statistics South Africa Release No. P0276, *Survey of Employers and the Self-employed* (SESE) supplies data of own-account employees that produce agriculture products for themselves. This release provides the net profit of each owner that has been trading informally in the last month. The data is multiplied by 12 and divided by R1 000 to obtain millions. This release only provides data for the reference periods 2009 (R264 million net profit) and 2013 (R255 million net profit). In order to determine the data for the two reference years (2011 and 2016), the annual growth rate of the agriculture sector published by Statistics South Africa in release No. P0441, *Gross domestic product (GDP), 4th Quarter 2017* between 2009 and 2016 is calculated, taking the annual GDP agriculture growth rate into consideration. Thus, the output for 2011 and 2016 is calculated. Intermediate consumption (IC) is seen as zero, because net profit is taken into account and the assumption is that all expenditure has been excluded. Value added is therefore output minus intermediate consumption.

Table 4.5: Total small-scale agriculture activities for own and final consumption for 2011 and 2016 (R' million)

	Output	Intermediate consumption	Value added
2011	258	0	258
2016	324	0	324

Table 4.5 shows that in 2011, R258 million was added to the total economy, and in 2016, this increased to R324 million. Own-account agriculture data is added to the informal data of fishing and forestry in Table 4.11 to obtain data for the total informal sector.

4.2.1.4 Illegal agriculture sector

According to the OECD (2002:152-156), the following is seen as illegal activities, which are also based on Blades (1983): the production of dagga, poaching, illegal fishing (caviar and other sea products), hunting, tree cutting, etc. Illicit actions can never be accounted for in full, although according to the 2008 SNA: 48, it still remains a transaction, and as it constitutes an agreement between parties to plant and harvest, it should be added in the production account of national accounts. However, the likelihood still exists that a large portion of this sector is not accounted for.

Cultivation of dagga/marijuana/cannabis – According to the report by the UN Office on Drugs and Crime, *World Drug Report* (2004:131), South Africa is one of the major countries (ranked fourth in the world) when it comes to the production of dagga. The reason for this is the relaxation in the strict control of air, land and sea borders (UN 2002:6).[24]

To meet the objective of the study, the methodology follows international standards recommended by the OECD (2002:156) published literature to determine illegal production. The OECD (2002) suggests that police data is a method to calculate domestic consumption of illegal drugs; thus, the consumption should be in line with the production (supply and demand). In the case of South Africa, this data is not available, and consequently the study is based on the most recently published report by the UN (2002), *South Africa: Country Profile on Drugs and Crime*. No further data published after 2002 is available from either the SAPS or the UN.

Determining output, the cultivated land production in tonnes/ha is multiplied by the price. According to the most recent report (UN 2002:12), *South Africa: Country Profile on Drugs and Crime*, statistics indicate that the cannabis output was estimated at 1 247[25] tonnes in 2000. The output per tonnes remained stagnant for 2011 and 2016, as no recent data is available. It should be taken into account that this is a "wet" plant, but when it is sold to the market, it is usually dry. According to the "Bureau

[24]UN (2002) *South Africa: Country Profile on Drugs and Crime*.
[25] https://www.unodc.org/pdf/southafrica/sa_drug.pdf

of Medicinal Cannabis" in the Netherlands, the dry plant is approximately 28% of the wet plant. The output (1 247 tonnes) is multiplied by 28%, which will determine the final output.

Trying to determine the price of dagga becomes more difficult, because an indoor cultivation price is higher than the outdoor price, and the stem, seed and flowers have different prices. The assumption is made that the outdoor price should be used, as most of the dagga is cultivated in rural outdoor areas in South Africa. To obtain a price of dagga, the prices reflected in the report by the International Tobacco Growers Association, the *Tobacco Courier* (Report No. 71, 2017:17)[26] are used for 2015/2016. The price of tobacco in ZAR was 40,06 per kg in 2016/17. This price can be disputed, as this is the legal price in obtaining the tobacco from the farmers, and seeing that dagga is an illegal product, the price can be much lower. On the other hand, it can also be that the price is higher, as it is an illegal activity and more risk is involved because the entire crop can be destroyed. To counter this argument, the price of dagga is based on the international index "weed index"[27] that indicates the price of cannabis as being $4 a gram (2018). To calculate the prices for the two reference years (2011 and 2016), the conversion rate from dollar to rand for each year is used to determine the price in ZAR, which amounts to R8,12 for 2011 and R13,65 for 2016. Therefore, the price of 4 grams of cannabis is R32,48 for 2011 and R54,60 for 2016.

When measuring the intermediate consumption, this refers to the input cost of dagga. In a study by J.P. Caulkins (2010:13), *Estimated Cost of Production for Legalized Cannabis*, outdoor cultivation of cannabis produces cannabis at a cost of less than 1% of turnover. The author states that production per acre is around 500+ pounds for dry cannabis where the cost of production is $1 per pound (this relates to outdoor production). This finding is supported by a discussion paper of UNESCO's Management of Social Transformations programme (1999), *Cannabis in Lesotho: A Preliminary Survey* (1999), in which it is claimed that production cost is very low, since very little fertiliser and pesticides, and no irrigation and harvesting costs are involved, and labour is normally undertaken by family members.

Value added is calculated by output (1 247 tonnes) multiplied by 28% (dry plant value) multiplied by the price – R8,12 per 1 gram for 2011 and R13,56 for 1 gram for 2016. Intermediate consumption

[26] http://www.tobaccosa.co.za/wp-content/uploads/2017-APRIL-ITGA-Tobacco-Courier.pdf
[27] http://weedindex.io/#fullstudy

(IC) is 1%. Value added is output minus intermediate consumption. The value added calculations are shown in Table 4.6.

Table 4.6: Measuring value added of cannabis production for 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011	2 835	28	2 806
2016	4 728	46	4 682

Table 1.6 reflects that the value added of cannabis for 2011 is R2 806 million and R4 628 million for 2016. The intermediate consumption still remains low, as this is an illegal activity and the minimum cost is always involved to ensure maximum output. In the case of intermediate consumption, the 2008 SNA characteristics discussed in Chapter 2 confirm that the intermediate consumption of illegal activities is very low.

A further illegal activity that forms part of the agriculture sector is poaching.

Poaching – Poaching includes all forms of poaching such as illegal poaching of rhinos, elephants, all kinds of buck, etc. In this discussion, only rhinos and elephants are taken into account as little published data is available for poaching of other animals. Elephants are poached for ivory whereas rhinos are poached for their horns. Both ivory and rhino horn have become a very profitable business in recent years. However, by concentrating on elephants and rhinos only, the likelihood does exist that the total illicit poaching figure is underestimated.

Rhino poaching – The output is measured by taking into account the number of rhinos poached, multiplied by the average price received on the market for rhino horn. According to Eurostat's *Handbook on the compilation of statistics on illegal economic activities in national accounts and balance of payments* (2018:39), the price is determined by the supply of goods multiplied by the quantity. Output equals value added.

In 2011, the number of rhinos poached was 448, and 1 054 in 2016. The price of white rhino horn is taken at R199 794 in 2011 and at R456 412 in 2016. The intermediate consumption equals zero, as the intermediate cost is so low that it is not worth including.

Output for 2011 is determined by 448 multiplied by the price of R199 794 divided by a million, as value added is given in R million. Output for 2016 is determined by 1 054 multiplied by the price of R456 412 divided by a million, as value added is given in R million.

Elephant poaching – The output is measured by taking into account the number of elephants poached, multiplied by the average price received on the market for ivory. In 2011, no elephants were recorded as having been poached, although in 2016, a total of 46 elephants were poached. The price to hunt an elephant varies from $25 000 to $60 000; thus, an average price of $42 500 is used. To determine the output, the price (R576 300) is multiplied with the number of elephants poached in 2016 (46) divided by R million.

Table 4.7: Measuring the value added of rhino and elephant poaching for 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011 (Rhino)	96	0	96
2016 (Rhino)	481	0	481
2016 (Elephant)	27	0	27

Table 4.7 shows that the value added of poaching in 2011 amounted to R96 million (only rhino value added is taken into account because no quantity for elephant poaching is reflected in 2011). The value added for 2016 amounts to R508 million (this includes rhinos and elephants).

4.2.2 Measuring the size of NOE activities in the forestry subsector (SIC 12)

4.2.2.1 Informal forestry

Informal forestry consists of small-scale farmers who produce and sell forestry products on a small scale to fulfil basic personal needs. To decrease illegal logging, the DAFF gave previously disadvantaged groups the opportunity to create businesses as small-scale farmers (30 000), independent contractors (300) and saw millers (240). The characteristics that the DAFF considered to determine what small-scale farming was, included firstly, that the land owner must have less than 100 hectares of timber plantation, and secondly, the land owner must be a previously disadvantaged person who suffered under apartheid. When determining small-scale forestry output, the following assumptions are considered:

To determine the output and intermediate consumption of forestry products, the discussion paper by Howard et al. (2005), *Small-scale timber production in South Africa* is used. According to this paper, the revenue obtained from timber by small-scale farmers (informal) is R115 million per annum (2005). This does not take into account the sub-trade of poles, firewood and of the forest products supplied to people in the community. IC is determine by taking output multiply by 35%, this is part of the production cost, and this amounted to R40,25 million in 2005. The cost excludes compensation, transport and loan interest.[28] These calculations were done for the period 2003/2004. As two data points are used (2011 and 2016), the data is adjusted with an average growth rate of 3% per annum. In some years it differs, but the average growth rate is calculated between the years 2012 and 2016 and applied from 2005 onwards.

Table 4.8: Total value added of small-scale timber farmers for 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011	137	48	89
2016	159	56	103

Table 4.8 indicates that in 2011 and 2016, informal forestry contributed R89,2 million and R103,4 million, respectively, to the total economy. It is very likely that this amount is underestimated because as the price of wood increases, the input cost can be much lower than 35%, as most of the small-scale farmers are also subsidised by government.

4.2.2.2 Illegal forestry

According to a report by the Department of Agriculture, Forestry and Fisheries (DAFF), 80% of poor households use fuelwood as their main source of energy. DAFF reports that the gross national value of this logging amounted to R3 billion annually – approximately R2 000 per household per annum. Furthermore, traditional healers (300 000) and about 28 million people use plants for medicines. The gross value of such traditional medicines is unknown by DAFF. It is, however, very likely that the total gross value of illegal forestry is underestimated because building poles, medicinal plants and edible fruits are not taken into account. To measure illegal forestry output, only data from DAFF is taken into account, and no additional assumptions are made.

[28] http://pubs.iied.org/pdfs/9559IIED.pdf

Table 4.9: Measuring illegal forestry value added for 2011 and 2016 (R' million)

Year	Output[29]	Intermediate consumption	Value added
2011	3 000	0	3 000
2016	3 000	0	3 000

The table reflects the same amount for 2011 and 2016, because this is the only published data available from DAFF. Intermediate consumption reflects a zero as the assumption is made that wood is taken from the land illegally, and is collected by members of a household, so no cost for fetching wood is involved. The likelihood exists that this sector is still underestimated, especially when one considers the high unemployment rate. In this scenario, poor households turn to alternative ways of generating an income. Furthermore, with the steep increase in the price of electricity, poor households are sure to find alternative ways of generating electricity.

4.2.3 Measuring the size of NOE activities in the fishing subsector (SIC 13)

The fishing subsector consists of the formal fishing sector as well as the informal fishing sector, fishing for own use and illegal fishing activities. In line with the objective of the study, the formal fishing sector is not discussed.

4.2.3.1 Fishing for own use

Fishing for own use/subsistence fishing is defined as people who fish for own/family use to consume on a small scale, but who are sometimes also engaged in barter of excess catch (G.M. Branch et al., 2002).[30] Furthermore, fishing for own and final consumption contributes to poverty reduction and increased food security. According to an article by Isaacs & Hara (2014:7), "*Backing small-scale fishers: Opportunities and challenges in transforming the fish sector"*, there are 8 078 small-scale subsistence fishers in South Africa. The approximate size of subsistence fishing is very small – about R2 million and is not taken into account in measuring the output of fishing.

[29] Facts and Figures of Poverty DAFF http://www.daff.gov.za/daffweb3/Branches/Forestry-Natural-Resources-Management/Forestry-Regulation-Oversight/Facts-and-Figures/Poverty

[30] SA journal of Marine science (2002) Defining fishers in the SA context: subsistence, artisanal and small-scale commercial sector (ISSN: 0257-7615)

4.2.3.2 Informal fishing

Informal fishing is defined as fishing on a small scale. Informal fishers normally have a licence to fish a certain quantity. Therefore, such fishing is legal but limited in quantity. To determine the GVA by informal fishing, the characteristics of the 2008 SNA are used, as explained in Chapter 2 of this thesis. The OECD (2002) does not describe how to measure GVA associated with informal fishing, as this is a country-specific activity and handled accordingly.

The methodology is analytic in nature and the activity is measured using Statistics South Africa Release No. D1300, *Survey of ocean (marine) fisheries and related services* (Statistics South Africa, 2015:15) as the basis of this discussion. A concern is that data availability only exists from 2014. To determine data for 2011 and 2016, the growth rate is based on data provided in Statistics South Africa Release No. P0021, *Annual financial statistics* for the fishery sector sales.

The output of R2 546 million (2014) and of R3 134 million (2015), is based on Statistics South Africa Release No. D1300 (Statistics South Africa, 2015), and by adjusting the data based on the fishery sector growth rate, amounted to R2 540 million for 2011 and R3 137 million for 2016. This output is shown in Table 4.10. The growth rate depicted by Statistics South Africa Release No. P0221, *Annual financial statistics 2016* (AFS) (Statistics South Africa, 2016) is used to calculate the output for 2011 and 2016.

When determining the intermediate consumption of fish caught through informal fishing, it should be kept in mind that not all expenditure items reflected in Statistics South Africa, release No. D1300 (2015:17) are used. The assumption is made that the informal fisherman's expenditure would be minimal, and only protective clothing, spares, fuel, dry ice and bait seem to be part of IC. As far as fuel consumption is concerned, the total contribution is not taken into account, as it is assumed that small boats do not consume the same amount of fuel as commercial boats and ships (only 50%). The data is adjusted based on the fishery sector data provided by Statistics South Africa Release No. P0221, *Annual financial statistics 2016* (AFS) for 2011 and 2016. When one takes the expenditure items of the Statistics South Africa release into consideration, one can assume that the IC is on average 27% of output. The IC is R685 (2011) and R846 (2016).

Value added is calculated by output minus intermediate consumption.

Table 4.10: Measuring value added of informal fishery sector for 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011	2 540	685	1 855
2016	3 137	846	2 291

The value added amount in Table 4.10 reflects a steady increase between 2011 and 2016, a finding that is supported by the AFS data. The data cannot be compared to the "*Survey of Employers and the Self-employed*" (report No. P0276:22), produced by Statistics South Africa, as data for the subsectors is not available. The following section will concentrate on illegal fishing, although it is also difficult to measure the size of this sector because of underground activity.

4.2.3.3 Illegal fishing

According to the Queensland Government Department of Agriculture and Fisheries*, "Illegal fishing activities"* [31], illegal fishing is defined as illegal use of nets, fishing when the fishing season is closed, taking female crabs and small fish, using extra numbers of crab pots, demolishing ocean habitat and harvesting oysters from licensed oyster grounds. The OECD (2002) handbook does not provide a method on how to measure the illegal activities, namely these are country specific and are dealt with accordingly.

According to an article by Schraader (2013), *The Impact of Illegal Fishing on South Africa's Economy*, South Africa is losing R4 billion annually from illegal fishing. To measure illegal fishing output, the following assumptions are considered for 2011: The amount of R4 000 million has been taken from 2013 data and has been adjusted by the growth rate of the fishing sector based on the growth rate published by Statistics South Africa, Release No. P0221, *Annual financial statistics 2016* (AFS) for 2011 and 2016. Thus, for 2011 the output is R3 414 and for 2016 the output is R5 417.

Intermediate consumption is calculated on the same basis as that of informal fishing (i.e. that 27% of output is intermediate consumption), and is as follows:

Table 4.11: Measuring the value added of fishing for own use for 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011	3 414	921	2 492

[31] https://www.daf.qld.gov.au/business-priorities/fisheries/monitoring-compliance/illegal-fishing-activities

2016	5 417	1 462	3 954

The data could be underestimated when other reports are taken into account. According to a news article by Gosling (2009),[32] *"Illegal fishing costing SA billions"* (2009), illegal fishing costs South Africa R6 billion annually. The losses in abalone alone was R4,4 billion in 2005. According to the World Wide Fund (WWF) report (2011:12),"*Fisheries: Facts and Trends South Africa",* illegal harvesting of abalone exceeded the legal commercial catching by 10 times during the past decade. The increase in illegal activities is ascribed to the depreciation of the rand that leads to higher prices for abalone in international markets and increased unemployment in South Africa.

4.3 New estimation of informal and illegal agriculture sector (SIC 1)

This section reflects two datasets – one for the reference period 2011 and the other for the reference period 2016. Table 4.12 indicates the value of total output, intermediate consumption and the value added separately, and includes the total sector (SIC 1) illegal activities and informal sector.

Table 4.12: Total informal sector and illegal activities for SIC 1 reference period 2011 and 2016 (R' million)

Year	Output[33]	Intermediate consumption	Value added
2011	22 939	1 682	21 255
2016	33 705	2 410	31 294

When all of the above values are taken into consideration, the likelihood still exists that the value added of this sector is underestimated. The main reason is that some illegal activities are still not reflected, such as the actual value of abalone harvest, crab harvest, hake harvesting, oysters, etc. The illegal side of hunting - such as poaching of all animals, except rhino horns - is not taken into consideration because of unavailability of data.

[32]https://www.iol.co.za/news/south-africa/illegal-fishing-costing-sa-billions-439821

[33] Facts and Figures of Poverty DAFF http://www.daff.gov.za/daffweb3/Branches/Forestry-Natural-Resources-Management/Forestry-Regulation-Oversight/Facts-and-Figures/Poverty

4.3.1 Evaluation of published data against newly calculated estimates for the agriculture sector

The evaluation against the published data determines if the informal sector and non-observed economy are over-/underestimated. The two reference periods, namely 2011 and 2016, are shown separately.

To determine the over-/underestimation of the NOE activities, as outlined in the objective statement, the newly calculated NOE activities SIC 1 for the specific reference year are evaluated against the existing published data. The existing data by Statistics South Africa, Release No. P0441 is obtained from Table 4.2, column 3.

Table 4.13: Total informal sector and illegal activities for the reference period 2011 (R' million)

	Total published formal, informal, illegal of SIC 1	New estimation of formal, informal, illegal SIC 1 sector	Over-/underestimation of the agriculture sector (SIC 1)
Intermediate consumption	299	1 682	-1 383[34]
Total gross value added	628	21 255	-20 627
Total output at basic prices	926	22 939	-22 013

From the above table, it is clear that the value added for the period 2011 is underestimated by R20 627 million, this means an underestimation of the GDP calculations. Intermediate consumption is underestimated by R1 383 million. An argument can exist that the intermediate consumption is underestimated, thus the value added indicates a higher underestimation. It should be kept in mind that this is an illegal and informal activity, so the producer's focus is on keeping expenditure as low as possible and output as high as possible. In the case of illegal and informal activities, the producer uses minimum input cost such as basic tools. It should also be noted that international guidelines are followed with regard to the characteristics, which are discussed in Chapter 2. The following methodology is used to determine the 2016 reference year.

To determine the over-/underestimation of the informal sector and NOE activities for the calendar year 2016, the existing data (Stats SA, release No. P0441 Table 4.3, column 3) is evaluated against the newly estimated agriculture sector informal sector, small-scale sector and illegal activities.

[34] A minus in front of the amount reflects the underestimation whereas the positive shows and overestimation

Table 4.14: Total informal sector and illegal activities of SIC 1 reference period 2016 (R' million)

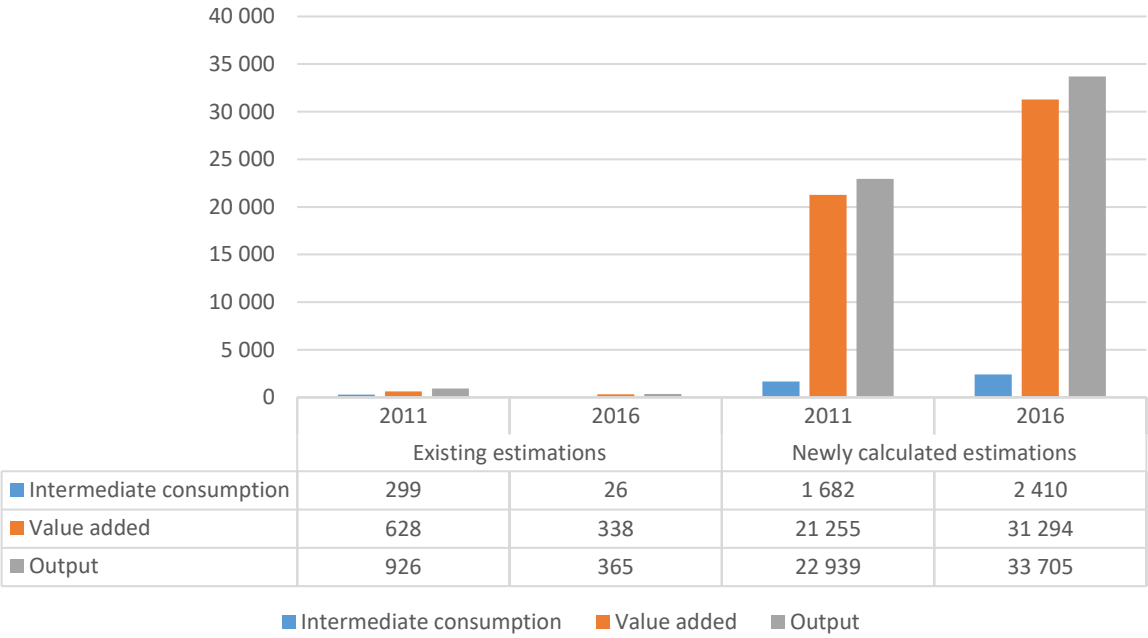
	Total published formal, informal, illegal of SIC 1	Current estimation of formal, informal, illegal SIC 1 sector	Over-/under-estimation of the agriculture sector (SIC 1)
Intermediate consumption	26	2 410	-2 384
Total gross value added	338	31 294	-30 956
Total output at basic prices	365	33 705	-33 340

From the above table, it is clear that the value added for 2016 is underestimated by R30 956 million for SIC 1 value added resulting in an underestimation of the total GDP. The results of both years (2011 and 2016) indicate an underestimation of intermediate consumption, value added and output. The reason for this can be that not all characteristics of the 2008 SNA were taken into account when data was published by Statistics South Africa in the GDP release (P0441). As mentioned in Statistics South Africa Report No. D0409, the 2008 SNA was "partially implemented". The second reason is that in the previous published data, not all sources were available, and agriculture data was still based on the agriculture census of 2007. Since then, more data has been made available by Statistics South Africa, and these statistics are included in the estimations. A further reason is that not all informal and NOE activities are added in the subsectors, e.g. fishing and forestry. It is also unknown if the results of the latest agricultural survey published by Statistics South Africa in Release No. 03-01-05, *Community Survey 2016: Agricultural Households* (2016), were implemented.

4.3.2 Gap between existing published calculations and newly estimations of the agriculture sector

This section illustrates by means of a graph the differences between current published data against the new estimations for 2011 and 2016, shown above. This section will also provide reasons why data differs, and limitations exist. Some recommendation on how to close the gap between the new calculations and published data will also be provided.

Graph 4.1: The gap between the newly NOE sector of SIC 1 compare to the current estimates of the NOE sector for the calendar year 2011 and 2016



	2011	2016	2011	2016
	Existing estimations		Newly calculated estimations	
Intermediate consumption	299	26	1 682	2 410
Value added	628	338	21 255	31 294
Output	926	365	22 939	33 705

Graph 4.1 illustrates the gap between the current data and newly calculated NOE sector. Some of the reasons that caused the gap between the current estimations and newly estimates are firstly, not all characteristics of the 2008 SNA were considered when data was published by Statistics South Africa in the GDP release (P0441). This has been verified by Stats SA, Report *No. 04-04-03 (2010)*, where it is mentioned that the 2008 SNA was "partially implemented".

Secondly, the new calculations include the newest international guidelines in this discussion as on how to determine the actual size of the NOE sector. It is, however, not clearly indicated which international guidelines are implemented in the current estimations as the only one mentioned is the 2008 SNA. No mention is made of the Eurostat (2018) and OECD (2002) documentation.

Thirdly, the current new calculations of the NOE methodology are described under section 4.2, however, the methodology used by Statistics South Africa in the current release No. P0441, "Gross domestic product (GDP)" to measure the value added of the NOE sector is not mentioned.

Furthermore, it is being acknowledged by the researcher that some data limitations still exist with regard to data availability on illegal activities from the SAPS. Limitations on the guidelines of the OECD (2002) handbook on how to measure illegal and informal activities specific to the agriculture sector are not stipulated step-by-step, thus the assumption is that calculations are country specific. The

likelihood exists that illegal fishing is underestimated as it excludes hake, crab, tuna, etc. Lack of police data leads to more assumptions being made with regard to illegal logging. It is also noted that the social and environmental impact of illegal logging is excluded from the above calculations. A further limitation exists with the lack of published data from the Department of Agriculture, with regard to the methodology in use to measure output, value added and IC. This department lacks data because of the non-existence of a more recent census than 2007. Fishery and forestry data is limited and illegal fishery is not measured properly.

To close the gap between existing published data and newly estimations, the methodology can be revised as soon as the next agriculture census data becomes available to ensure that the informal, small scale farming sector and illegal farming data is available. The area of farming and type of farming play an important role to ensure that the size of the activity is measured. Small-scale farming that is assisted by government needs to be recorded. Informal fishing licenses that are issued by government should be reported. Forestry data should be more detailed.

To overcome all these limitations the researcher acknowledges that some assumptions are made and data can be revised in the future.

4.3.3 Concluding remarks regarding the non-observed agriculture, fishing and forestry sector

The conclusion is that the size of the agriculture sector has been underestimated by R21 255 million (2011) and R31 294 million (2016), respectively, taking the value added into account. Secondly, the discussion is in line with international guidelines. Furthermore, national accountants can use the methodology provided in this section to determine the informal and NOE for the agriculture sector.

The following section discusses the last part of the primary sector, namely the mining sector. The mining sector consists of the formal sector, informal mining/artisanal small miners (ASM) and illegal mining sector.

4.4 THE MINING SECTOR (SIC 2)

4.4.1 Introduction

Apart from the agriculture sector, mining is also a primary sector. According to Statistics South Africa Release No. P0441, "*Gross domestic product (GDP) 1st quarter 2016*", the table in use is GDP annual and regional table 2016, worksheet "SUT 2011", the mining sector value added represents 9.,6% of the total economy value added in 2011. In 2016 the mining sector value added declined to 7.,9% of the total economy value added (Statistics South Africa Release No P0441, *"Gross Domestic Product (GDP), 4th Quarter 2017*", the table in use is GDP annual, quarterly and regional Fourth quarter 2017.xls, worksheet *"SUT 2016 (10_10*)" . It is notable that the mining sector value added reflects a decline of 1,9% between 2011 and 2016. This can be a result of a declining formal sector, and increased NOE mining activities.

In terms of the research problem formulated for the purposes of this study and the conceptual framework shown previously, the question to answer is if the mining sector total size is accounted for in the GDP. Is this sector over-/underestimated when one considers parameters such as unavailability of illegal data, assumptions and administrative data when measuring the NOE sector?

The outline of this section consists of the current estimations, followed by the new estimations, the total measurements of the NOE sector and lastly, the conclusion and limitations encountered.

4.4.2 Current estimation of value added in statistical release published by Stats SA

In order to determine the current size of the mining sector, the Standard Industrial Classification (SIC) is considered. According to the SIC, the mining sector comprises the mining of coal and lignite, mining of gold and uranium ore, and mining of metal ores, other mining, and quarrying sectors. All these sectors are measured to ensure that the total size of the mining sector is accounted for. In order to measure the size of the mining sector, the following formula is considered:

SIC 2 = Mining sector (Formal mining sector + small-scale mining sector/informal mining sector + illegal mining sector)

Taking the size of the mining sector formula into consideration, the existing estimates for the mining sector are obtained from two statistical releases. Firstly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP) 1st quarter 2016*", the table in use is GDP annual and regional table

2016, worksheet "SUT 2011"; this represents a 10 x 10 supply and use table. Secondly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP)" 4th quarter 2014*", the table in use is tables 4th quarter 2014.xls, worksheet "Use table 2011"; this represents a 64 x 105 supply and use table.

The difference between the two tables is firstly, that the 10 x 10 use table is only a condensed version of the 64 x 105 use table. Secondly, the 10 x 10 use table includes the informal sector, small-scale mining sector and illegal activities ***as part*** of the mining sector, whereas the 64 x 105 use table shows the informal sector, small-scale mining sector and illegal activities of all the sectors as ***one column*** in the statistical release.

Before determining the estimates of the 2011 calendar year, the 64 x 105 use table needs to be condensed to reflect a 10 x 10 use table as well. This allows the researcher to subtract the two tables, the 101 x 10 and 64_105, from each other to calculate the informal mining sector, small-scale mining sector and NOE mining activities separate for each sector. The reason for subtracting the two tables from each other is that the 10 x 10 SUT shows all sectors including the informal, small-scale and NOE activities as part of the sector, whereas in the 64 X 105 informal, small-scale and NOE activities is shown separately; thus, by subtracting the two tables, the informal sector, small-scale sector and NOE activities are determined by sector separately. This allows the researcher to measure if the informal sector, small-scale sector and NOE activities are under-/overestimated. Determining the 2011 SIC 2 informal sector, small-scale sector and NOE activities involve a couple of steps.

A problem, however, manifests when comparing the two tables, 10 x 10 use table (published 2016) and – after condensing – the 64 x 105 use table (published 2014) to a 10 x 10 use table. It is notable that the two tables differ in IC, value added and output. The reason for this, is that the 10 x 10 use table was revised in 2016, although it is not mentioned which sector was revised. To accommodate for this revision of the 10 x 10 use table (2016) IC, value added and output, the 64 x 105 use table (2014) is revised and compressed to a 10 x 10 use table. The assumption is made that the revision is added to the informal mining sector, illegal mining sector and own account mining sector.

The second step is that the two tables are subtracted from each other. The difference between the two tables represents the informal mining sector, illegal mining sector and own account mining sector, e.g. the difference of revised 10 x 10 supply and use table published P0441 GDP 1st quarter (2016) value added is R261 575 million, whereas the 64 x 105 use table is condensed to a 10 x 10 table value added R262 097 million, equals to a revision of -R525 million. This amount reflects the

current estimations for the 2011 informal mining sector, illegal mining sector and own account mining sector.

Table 4.15: Informal mining sector, illegal mining sector and own account mining sector for 2011 year (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Translated 64 x 105 to condensed in 10 x 10 use table (2014)	Mining NOE sector
Intermediate consumption	181 244	178 366	2 878
Total gross value added	261 575	262 097	-522
Total output at basic prices	442 820	440 463	2 356

Source: Statistics South Africa (release No. P0441, 4th quarter 2014)

Table 4.15 reflects the portion that is allocated to the informal mining sector and the small and illegal mining sector, thus the intermediate consumption (IC) is calculated by taking the 2016 revised use table minus the 2014 condensed 10 x 10 table. Determining 2011, the intermediate consumption reflects R2 878 million, value added (–R522 million) and output (R2 356 million). This current mining NOE IC, value added and output data are compared under point 4.4.5 with the new estimates for 2011.

The following section determines 2016 mining informal, small and NOE activities IC, value added and output. A release by Statistics South Africa is taken into account, Release No. P0441, "*Gross domestic product (GDP) 4th quarter 2017*", Annual, quarterly and regional fourth quarter 2017.xls tables are used, worksheet "SUT 2016"; this represents a 10 x 10 use table and worksheet "use table 2016 (64_105)" that represents the larger use table. The 2016 data is not revised; thus, the two releases are used as is. The 64 x 105 use table is just condensed to a 10 x 10 use table. The difference between the two 10 x 10 use tables determines the portion that is allocated to the SIC 2 informal sectors, own account sector and NOE activities sector, see table below.

Table 4.16: Mining informal sector, small-scale sector and illegal sector for 2016 year (R' million)

	Use table 10 x 10 published P0441 GDP 1st quarter 2016	Supply and use table 64 x 105 condensed to 10 x 10 use table	Difference between two tables reflects the mining NOE sector
Intermediate consumption	264 361	264 296	65
Total gross value added	307 303	306 897	406
Total output at basic prices	571 664	571 193	471

Source: Statistics South Africa (release No. P0441, 4th quarter 2017)

Table 4.16 represents the 2016 data that is allocated to the informal mining sector, small-scale mining sector and illegal mining sector. This current mining informal, small and NOE activities IC, value added and output data is compared under point 4.4.5 with the new estimates of the informal mining sector, small-scale mining sector and the illegal mining activities for 2016.

The following section represents the new calculation of the informal mining sector, small-scale mining sector and the illegal mining activities for the reference years 2011 and 2016.

4.4.3 New calculations of the mining sector informal and illegal activities (SIC 2)

The informal mining sector mainly comprises artisanal (also called small-scale) miners that extract minerals under a legal licence, as discussed in 4.4.3.1.1. The illegal activities of the mining sector are mostly around the "*zama zamas*" that extract natural resources illegally without legal licences, which is discussed under 4.4.3.1.2.

4.4.3.1 Informal mining sector

4.4.3.1.1 Artisanal and small-scale mining (ASM)[35]

To reduce illegal mining and ensure a safer environment that miners can work in, the South African government through the Department of Minerals and Energy legalised small-scale mining. ASM is defined as artisanal miners, and their enterprises are classified as micro-companies (having less than five employees), very small companies (having fewer than 20 employees) and small companies (having fewer than 50 employees). These companies must operate in single commodity. ASM involves surface mining and comprises panning, sluicing, front-end loader and strip-mining operations. The Department of Minerals and Energy (now known as the Department of Mineral Resources or DMR) established the directorate of SSM to improve and address the challenges faced by the small-scale mining sector and to reduce illegal mining.

For the informal mining sector, the methodology is a quantitative and analytical study where no alternative questionnaire is distributed. The existing data of authors, and published data by DMR and MINTEK, are used and analysed. In the case of the informal sector, South Africa's national mineral research organisation (MINTEK) data is used. No international specific guidelines are prescribed from

[35] Open society foundation for SA (2017) "Preliminary study on artisanal and small-scale mining in South Africa" by authors Pontsho Ledwaba Pontsho and Prof. Nellie Mutemeri Nellia

the OECD (2002) to determine informal and illegal mining activities, but it does mention that most of these activities are country specific and should be handled accordingly.

To determine the output for the informal mining sector, the number of employees are multiplied by the daily income multiplied by the days worked per annum. Currently, South Africa has 10 000 to 30 000[36] (number of employees) small-scale miners[37] /ASMs. A study by Ledwaba P. (2011), *The status of small-scale mining sector in South Africa: tracking progress,* shows that in 2011 about 1 030[38] permits were issued for small-scale miners. According to a study by the Open Society Foundation SA (2017), *Preliminary study on artisanal and small-scale mining in South Africa,* 3 350[39] mining permits were issued in 2016 for ASM. While the exact number of ASM is unknown, it is notable that the number of permits issued increased dramatically between 2011 and 2016. The average of these numbers is used to determine the number of miners; thus 20 000. This number is also supported by a publication of the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (2018:7), *Global trends in artisanal and small-scale mining (ASM): A review of key numbers and issues*.

To determine the daily pay that ASM employees receive, calculations are based on an article by the World Gold Council (WGC) (2013:17), *The direct economic impact of gold*, which states that artisanal miners/SSM earn around US$5 to $15 a day.[40] This average is lower in poor countries, and therefore the assumption is made by the WGC that the earnings are around US$10. If this is converted into rand, an ASM received R81,20 (2011) and R136,20 (2016) daily.

In an article by Stewart P.L. (2012:163), *Labour time in South African gold mines: 1886-2006*, a miner works on average 2 248 hours per year. When one takes the hours and divides these into 9 (as this is the maximum hours a worker may work in South Africa per day) it results in 249 days per year.

Output is thus determined by taking the days that are worked multiplied by the number of workers multiplied by the days and the salary earned per day. Thus, for 2011 it is 20 000 (number of workers) multiplied by 249 (days worked per annum) multiplied by R81,20 (daily rate) divided by a R' million

[36] http://www.osf.org.za/wp-content/uploads/2018/05/OFS-SA-Report-ASM-03NOV-WEB-Open-Society-Foundation-for-South-Africa-OSF-SA-Publications.pdf, another source http://www.scielo.org.za/scielo.php?script=sci_arttext&pid=S2225-62532017000100010
[37] IIED (2013:3) – Sustainable markets "Responding to the challenge of artisanal and small-scale mining: How can knowledge networks help?"
[38] Ledwaba P." The status of small scale mining sector in South Africa: tracking progress".
[39] Open Society Foundation SA (2017) "Preliminary study on artisanal and small-scale mining in South Africa"
[40] World Gold Council (2013:17), "The direct economic impact of gold"

to obtain calculations in rand million equals R357 million. Taking the same assumptions for 2016, the output is 20 0000 (number of workers) multiplied by 249 (days worked per annum) multiplied by R136,20 (daily rate) divided by an R' million to obtain calculations in rand million equals R599 million.

The assumption is made that intermediate cost is zero, as this is subsidised by government projects and the cost is borne by government. Value added is output minus intermediate consumption. Table 4.17 reflects the calculations for the informal mining sector (2011 and 2016).

Table 4.17: Measuring value added of informal mining sector by issuing licences (R' million)

Year	Output	Intermediate consumption	Value added
2011	404	0	404
2016	679	0	679

Table 4.17 shows that the total informal mining sector for the period 2011 to 2016 reflects a value added of R404 million (2011) and R679 million (2016). If data published by Statistics South Africa (2018) is used, i.e. the *Quarterly labour force survey (QLFS)* (release No. P0211) and the *Quarterly employment statistics (QES)* (release No. P0277) to measure the informal sector, the calculations reflect a lower value added.

To determine the output by taking the two releases by Statistics South Africa into consideration, the average number of employees (QLFS) multiplied by the average earnings (QES) per annum for employees is taken into account. For 2011, the average number of employees involved in informal activities amounted to 2 393 multiplied by the salary per annum, which is R41 871 per annum (formal activity) divided by R million, which amounts to output of R100 million. The 2016 year is calculated in the same way, i.e. the number of employees (5 504) multiplied by the average salary (R64 739) divided by R million, which equals R356 million per annum output. Intermediate consumption is calculated as zero, as the same assumption is made that this is a government-funded project and costs are borne by government. Value added is measured by output minus intermediate consumption.

Table 4.18: Measuring value added of informal mining sector using QLFS and QES data (R' million)

Year	Output	Intermediate consumption	Value added
2011	100	0	100
2016	356	0	356

Source: Statistics South Africa release No. P0211

When one compares Table 4.19 and Table 4.20, it is clear that the different scenarios reflect different value added. The reason for this is that a different methodology is used. The data published by Statistics South Africa (QES, release No. P0277:7) in Table 4.20 is based on a household sample of 3 000 dwellings, whereas Table 4.17 reflects the licences issued by DMR. DMR data is more reliable because the actual licences are accounted for, whereas Statistics South Africa data is based on household surveys, which can be undercounted. A further reason can be that an average number of employees is considered in Table 4.19 whereas the QES data does not have the exact number of employees involved in ASM because only 30 000 households are in the household sample. Furthermore, discrepancies exist because the QES uses an average formal salary per annum as data (Table 4.18), whereas Table 4.17 reflects the exact salary an employee received, based on a survey done by WGA.

It was therefore decided to consider the calculations in Table 4.17 for the informal mining sector. The reason for this was because the data is based on licences issued by the Department of Mineral Resources and is supported by several authors' published data. A further reason is that it meets the objective of the study: i.e. it should be in line with international prescribed guidelines. Table 4.19 is based on the Eurostat manual and guidelines publication (2018:29), *Handbook on the compilation of statistics on illegal economic activities in national accounts and balance of payments*, which mentions when data is not available, the income-based approach is used together with administrative data.

4.4.3.2 Illegal mining sector

Illegal mining is when the activity takes place without the permission of government, mostly to avoid taxes, and can include lack of mining licences, absence of land rights, and an exploration or mineral transport permit. This activity is mostly done by people that are known as “zama zamas”. The Eurostat (2018:19), indicates that on some occasions, where lack of data exists, assumptions should be taken into account. In this calculation, some assumptions are taken into account, but reference is mentioned by footnotes.

In an article by Ledwaba L. (2018), *Driven by poverty: the story of South Africa’s illegal miners,* several interviews were held with illegal miners. Illegal mining happens within the coal, platinum, diamond and gold mines. The “zama zamas” who were interviewed indicated that they worked approximately 12 hours per day, earning between R450 and R1 200 per shift. The number of illegal miners is 14 000, and the average days worked is 249 days per annum (249 days also applies to the informal sector).

To determine the output, an assumption is made because of the two data points (2011 and 2016), and therefore the minimum earnings for 2011 are R450 per day and R1 200 per day for 2016.

Output is measured by the number of illegal miners multiplied by the average earnings per day multiplied by the days worked. The average earnings by Zama zamas for 2011 are R450 multiplied by the number of Zama zamas, which is 14 000[41] (number of illegal miners), multiplied by the days worked (249) divided by R million; thus, for 2011 it equals R1 568 million. The same assumption measurement is used to determine the output for 2016, i.e. number of workers (14 000) multiplied by R1 200 per day, multiplied by 249 working days divided by R million, which equals R4 183 million per annum.

Although this contradicts the data published in the Mineral Council report (2016), illegal mining costs South Africa R20 000[42] million (2016) annually; this includes lost sales, taxes and royalties; and does not even take into account the social and environmental impact costs. This data is supported by an article by Seccombe A. (2017), *Sibanye suffers as illegal miners run rampant*, and indicates that Sibanye mines loss on output is approximately R20 000 million per annum.

According to the Mines South Africa report (2016:32), *Facts and figure, pocketbook*, South Africa's output on illegal mining is reported as R6 000 million per annum. Taking the previous two paragraphs into consideration, it is clear that the figures are not really matched, but this is to be expected, as the activity is illegal. In this discussion the report by Mines South Africa is taken into account for 2016. There is not really a clear reason, but the assumption is made that the Mines South Africa report excludes loss of sales, which is normally included in the mark up, taxes and royalties. To determine the values for 2011, the data is adjusted with the growth rate in formal mining production published by Statistics South Africa, Release No. P0441, *Gross domestic product (GDP)*.

The output for 2011 reflects R4 647 million as the year-on-year growth rate is taken into account from 2016 to 2011 calculated backwards. The output for 2016 is taken as R6 000 million. Intermediate consumption (IC) cannot be calculated as a ratio to output using the formal mining sector, as illegal mining has a minimum IC. IC is normally borne by the middleman that purchases from the actual

[41] https://www.miningafrica.net/mining-news/egolis-latest-gold-rush/
[42] Chamber of Mines of South Africa (2016) "Integrated annual review 2016 statistics", another source http://www.mineralscouncil.org.za/reports/2016/download/CM-IR16-focus-illegal-mining.pdf

miners, such as food and equipment to mine. Thus, IC is seen as zero. Value added is measured by output minus IC.

Table 4.19: Measuring illegal mining for the calendar years 2011 and 2016 (R' million)[43]

Year	Output	Intermediate consumption	Value added
2011	4 647	0	4 647
2016	6 000	0	6 000

Taking the discussion into consideration (prior to the table calculations), it is clear that the exact amount of illegal mining is difficult to measure so the likelihood definitely exists that it is underestimated. Articles that support the evidence that the calculations in Table 4.18 are underestimated are the published statistics of Coetzee B. & Horn R. (2006: vii), *The theft of precious metals from South Africa mines and refineries*, which indicated illegal mining represent R13 million losses each year. When comparing this result to table 4.20 it is clear that the value added is underestimated. A further discussion of illegal mining was that in 2013, R7 300[44] million of gold was illegally smuggled out of the country. Furthermore, other illegal production data is unavailable but according to an article[45] on diamonds and metal, the cost to the country with illegal production amounted to R7 000 million per annum. All of these supporting articles are not included in the above calculations, although it is mentioned in the Eurostat manual and guidelines publication (2018:28), *Handbook on the compilation of statistics on illegal economic activities in national accounts and balance of payments* that a demand approach can be followed; thus, if there is a demand to obtain an illegal product, it is produced somewhere.

4.4.4 New estimation of informal and illegal mining sector (SIC 2)

The total informal mining and illegal mining for the reference years 2011 and 2016 are shown in Table 4.20 and Table 4.21. Measuring the total informal and illegal activities by applicable year allows the researcher to determine the size of the mining sector and to answer the research question if the mining sector is under-/overestimated.

[43] https://www.reuters.com/article/us-sibanye-illegalminers-exclusive/exclusive-sibanye-says-clears-most-illegal-miners-from-gold-shafts-idUSKCN1GA0I2
[44] https://www.gov.za/speeches/deputy-minister-gg-oliphant-debate-illegal-mining-south-africa-13-oct-2016-0000 and https://www.reuters.com/article/us-safrica-mining-illegal/illegal-miners-in-south-africa-swallow-gold-in-condoms-idUSKCN1B514N
[45] http://www.engineeringnews.co.za/article/illegal-mining-worth-r7bn-a-year-pwc-2018-06-14

Table 4.20: Measuring total informal sector and illegal mining activities for 2011 (R' million)

	Informal mining	Illegal mining	Total informal and illegal mining
Intermediate consumption	0	0	0
Total gross value added	404	4 657	5 061
Total output at basic prices	404	4 657	5 061

Table 4.20 is calculated by adding the informal mining sector and the illegal mining sector together; this will assist in measuring the entire mining sector.

Table 4.21: Measuring total informal sector and illegal mining activities for 2016 (R' million)

	Informal mining	Illegal mining	Total informal and illegal mining
Intermediate consumption	0	0	0
Total gross value added	679	6 000	6 679
Total output at basic prices	679	6 000	6 679

The data in Table 4.20 and Table 4.21 for the respective years is compared with the published data to determine the over-/underestimation of SIC 2. The evaluation of data against the published data also excludes the formal sector as it is necessary to evaluate the entire SIC 2 sector.

4.4.5 Evaluation of published data against newly calculated estimates for the mining sector

The evaluation against the published data determines if the informal sector and illegal economy is under- or overestimated. The two reference periods, namely 2011 and 2016, are used because of periodically published data and the quality of the published data.

Table 4.22: Measuring the new estimates against the published GDP data for 2011 (R' million)

	Total published informal, NOE and formal mining	New estimation of informal, NOE and published data	Under-/ overestimation estimation of the mining sector
Intermediate consumption	2 878	0	2 878
Total gross value added	-522[46]	5 061	-5 583
Total output at basic prices	2 356	5 061	-2 705

When evaluating the above table, it is notable that the mining sector IC for the calendar year 2011 is underestimated. When considering the value reflecting for the published IC, the researcher disagrees

[46] This value added reflects a negative as the 2011 data was revised in 2016.

with this since IC on informal is borne by government and illegal mining has no IC. Value added is underestimated by R5 583 million, calculated by the new estimations minus the current published data. It is notable that the revised published value added is a minus - this is because of the revision and is not incorrectly reflected. One of the reasons for the underestimations is that Statistics South Africa did not annually implement all new international guidelines published, or data was not revised as it became available by households surveyed. A further reason is that not all activities such as small scale and illegal activities of the mining sector were taken into account.

To determine the values for 2016, the same methodology is used as for 2011. Table 4.23 reflects the 2016 calendar year estimates comparison.

Table 4.23: Measuring the current findings against the published GDP data for 2016 (R' million)

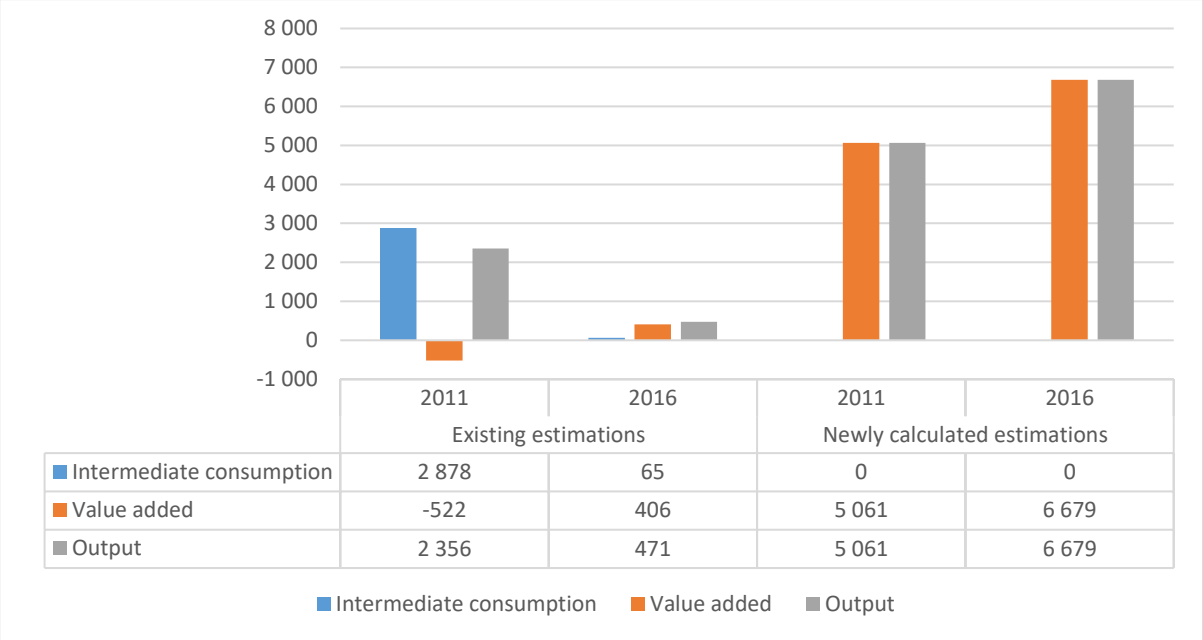
	Total published informal, NOE and formal mining	Current estimation of informal, NOE and published data	Underestimation of the mining sector
Intermediate consumption	65	0	65
Total gross value added	406	6 679	-6 273
Total output at basic prices	471	6 679	-6 208

For 2016, the mining sector is underestimated by R6 273 million applicable to value added. The reasons for the underestimation on value added are the same as mentioned in the 2011 year, as reflected above: little expenditure (IC) is borne by the illegal activity and informal mining. Furthermore, it is also not clear from the Statistics South Africa, Release No. P0441, *Gross domestic product* what methodology is used on how the informal sector is measured for the mining sector and secondly, what the exact informal sector and NOE activity sector sizes are.

4.4.6 Gap between existing published calculations and newly estimations of the mining sector

This section illustrates by means of a graph the differences of current published data against the newly estimations for 2011 and 2016. Secondly, it explains the reasons why data differs and limitations exist. Lastly, some recommendations are given on how to close the gap between new calculations and published data annually.

Graph 4.2: The gap between the newly NOE sector of SIC 2 compared to the current estimates of the NOE sector for the calendar year 2011 and 2016



	2011	2016	2011	2016
	Existing estimations		Newly calculated estimations	
Intermediate consumption	2 878	65	0	0
Value added	-522	406	5 061	6 679
Output	2 356	471	5 061	6 679

Graph 4.2 illustrates the gap between the current data and newly calculated informal mining sector, small scale mining sector and illegal mining activities. Some of the reasons that cause the gap between the current estimations and the new estimates are firstly, not all characteristics of the 2008 SNA were taken into account when data was published by Statistics South Africa in the GDP release (P0441), this is also verified by Statistics South Africa Report No. 04-04-03 (2010), where it is mentioned that the 2008 SNA was "partially implemented".

Secondly, the new calculations include the latest international guidelines in this discussion, like how to determine the informal sector and NOE activity as set out by the 2008 SNA, Eurostat (2018) and OECD (2002) guidelines. It is not clearly indicated which international guidelines are implemented in the current estimations, the only guideline that is mentioned is the 2008 SNA.

To avoid confusion around the methodology in use, it is explained how to measure the informal sector, own account sector and NOE activities of SIC 2 in the new calculations, whereas the methodology is not clearly explained in the current estimates by Statistics South Africa, Release No. P0441, "*Gross domestic product (GDP)*". In the newly estimates the latest data of DMR is reflective of the ASM, although it is unknown if these are included in Statistics South Africa's data.

Furthermore, it is acknowledged by the researcher that some data limitations do exist, especially with regard to the exact number of people involved in small scale mining. Secondly, the lack of SAPS data with regard to illegal mining is not reported and no value of goods is published in the annual report, thus no concrete data exists, and some assumptions are made. The counter argument is also true that some illegal mining is not included as mentioned above e.g. sand, stone etc.

To lessen the gap between current, published data and newly estimates the methodology can be revised as soon as new crime statistics become available from the SAPS, DMR and Statistics South Africa. An explanation of the methodology that Statistics South Africa use to measure the informal and illegal SIC 2 sectors can lead to more transparency and revisions of the newly estimates. It can also be worth measuring the formal sector, as it is unknown if ASM is seen as formal sector activity, thus a definition clarity is necessary. It is currently unknown if Statistics South Africa sees ASM as part of the formal or informal sector. Lastly, it can be helpful if Statistics South Africa can provide the informal, SSM and illegal mining activities separate and not as one column as shown in Release No. P0441, "*Gross domestic product (GDP)*"; this makes comparison and analysis clearer and the gap can be resolved.

4.4.7 Concluding remarks

The findings of the mining sector are that the informal mining sector, small scale mining sector and the illegal mining activities value added are underestimated for both years. A further discussion of the results will be reflected in the following chapter where all the findings of the informal sector and illegal activities are added together to determine under-/overestimation of the entire economy.

Taking the limitations into consideration, the research question regarding the size of the informal sector and illegal activities for the mining sector has been addressed using the methodology explained under point 2; these findings take the formula into consideration. The objective to use internationally prescribed practices for national accounts has been achieved, as the 2008 SNA characteristics of informal and illegal activities were used and the recommendations of OECD (2002) were taken into account. The contribution of these findings is that national accountants can follow the guidelines to improve calculations on the value added of the mining sector with regard to the informal/ASM sector and the NOE activities.

The following section under discussion, Chapter 5, consists of the secondary sector namely the manufacturing sector (SIC 3), electricity and water sector (SIC 4) and the construction sector (SIC 5).

CHAPTER 5: MEASURING THE SIZE OF THE NON-OBSERVED SECONDARY SECTOR ECONOMY

5.1 BACKGROUND

The secondary sector consists of the manufacturing sector (SIC 3), electricity and water sector (SIC 4) and the construction sector (SIC5). The secondary sector in the economy is seen as the sector where production takes place and where foods from the primary sector are transformed into user created items for domestic users, businesses for selling and for exporting goods. The secondary sector represents 21,2% of the total value added of the economy. This chapter initially deals with the secondary sector namely manufacturing sector, followed by the electricity and water sector and lastly, the construction sector.

5.2 DETERMINING THE SIZE OF THE NON-OBSERVED MANUFACTURING SECTOR

5.2.1 Introduction

In terms of the research problem formulated for the purposes of this study and the conceptual framework shown above, the question to answer is if the manufacturing sector's total size is accounted for in the GDP. Is the size of the manufacturing sector over-/underestimated? Are all informal manufacturing, small-scale manufacturing and illegal manufacturing activities included in the total manufacturing sector? The second aim of this section is to establish whether the measurements are in line with international guidelines. Thirdly, the aim is to estimate the informal/small-scale sector and illegal activities for the manufacturing sector and compare the new estimates with the existing published data.

The outline of this manufacturing sector discussion consists of the current estimations, followed by the new estimations, total measurements of illegal and informal activities, the evaluation between the current estimates and the new estimates, and lastly, the conclusion and limitations encountered when measuring the informal sector, small-scale manufacturing and NOE activities.

5.2.2 Current estimation of manufacturing value added in statistical release published by Stats SA

In order to meet the first objective with regard to the current size of the manufacturing sector, the Standard Industrial Classification (SIC) is taken into account. According to the SIC, the manufacturing sector includes goods that are manufactured within the boundaries of South Africa. Manufacturing of goods includes manufacturing of food products, textiles, wearing apparel, dressing and dyeing of

fur, all wood and paper manufacturing, printing, publishing and reproduction of recording material, coke, refined petroleum products, chemicals, rubber and plastic, non-metal products, basic metal, machinery and equipment, all electronics and electrical products, optical, watches, vehicle trailers, furniture, jewellery, etc. According to the objectives of this thesis, the discussion is on one-digit level (main level) and does not include lower levels. The size of the manufacturing sector is measured according to the following formula:

SIC 3 = Manufacturing sector (Formal manufacturing sector + small-scale manufacturing sector, informal manufacturing sector + illegal manufacturing activities)

Taking the size of the manufacturing sector formula into consideration, the existing estimates for the manufacturing sector are obtained from two statistical releases. Firstly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP) 1st quarter 2016*", the table in use is GDP annual and regional Table 2016, worksheet "SUT 2011"; this represents a 10 x 10 supply and use table. Secondly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP)" 4th quarter 2014*", the table in use is Tables 4th quarter 2014.xls, worksheet "Use table 2011"; this represents a 64 x 105 supply and use table.

The difference between the two tables is firstly, that the 10 x 10 use table is merely a condensed version of the 64 x 105 use table. Secondly, the 10 x 10 use table includes the informal sector, small-scale manufacturing sector and illegal activities ***as part*** of the manufacturing sector, whereas the 64 x 105 use table shows the informal sector, small-scale manufacturing sector and illegal activities of all the sectors as ***one column*** in the statistical release. The assumption is made that the difference between the two tables by sector represents the informal sector, own accounts sector and illegal activities.

Before determining the estimates of the 2011 calendar year, the 64 x 105 use table needs to be condensed to reflect a 10 x 10 use table as well. This allows the researcher to determine the difference between the two tables, the 10 x 10 and 64 x 105, and therefore, to calculate the informal manufacturing sector, small-scale manufacturing sector and illegal manufacturing activities separately for each sector. A problem exists when comparing the two tables, 10 x 10 use table (published 2016) and – after condensing – the 64 x 105 use table (published 2014) to a 10 x 10 use table. It is notable that the two tables differ in IC, value added and output. The reason for this is that the 10 x 10 use table was revised in 2016, although it is not mentioned which sector was revised. To

accommodate for this revision of the 10 x 10 use table (2016) intermediate consumption, value added and output, the 64 x 105 use table (2014) is revised and compressed to a 10 x 10 use table. The assumption is made that the revision is added to the informal manufacturing sector, illegal manufacturing sector and own account manufacturing sector.

The second step is to determine the difference between the tables This represents the informal manufacturing sector, illegal manufacturing sector and own account manufacturing sector, e.g. the difference of revised 10 x 10 use table published P0441 GDP 1st quarter (2016) value added is R362 693 million, whereas the 64 x 105 use table is condensed to a 10 x 10 table value added R 353 863 million, which equals to a revision of R8 830 million. This amount reflects the current estimations for the 2011 informal manufacturing sector, illegal manufacturing sector and own account manufacturing sector.

Table 5.1: Informal manufacturing sector, illegal manufacturing sector and own account manufacturing sector for 2011 year (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Translated 64 x 105 translate in 10 x 10 use table (2014)	Manufacturing NOE sector
Intermediate consumption	1 193 750	1 179 097	14 653
Total gross value added	362 693	353 863	8 830
Total output at basic prices	1 556 443	1 532 959	23 483

Source: Statistics South Africa (release No. P0441, 4th quarter 2014)

Table 5.1 reflects the portion that is allocated to the manufacturing sector informal, small and illegal sector. Therefore, IC is calculated by taking the 2016 revised use table minus the 2014 condensed 10 x 10 table. Determining the manufacturing 2011, the IC reflects R14 653 million, value added (R8 830 million) and output (R23 483 million). This current manufacturing informal, small and NOE activities IC, value added and output data is compared under point 5.2.5 with the new estimates for 2011.

The following section determines 2016 manufacturing informal, small and NOE activities IC, value added and output. A release by Statistics South Africa is taken into account, Release No. P0441, "*Gross domestic product (GDP) 4th quarter 2017*", Annual, quarterly and regional fourth quarter 2017.xls tables are used, worksheet "SUT 2016"; this represents a 10 x 10 use table and worksheet "use table 2016 (64_105)" that represents the larger use table. The 2016 data is not revised, thus the two releases are used as is. The 64 x 105 use table is just condensed to a 10 x 10 use table.

Determining the difference between the two 10 x 10 use tables, the result represents the portion that is allocated to the SIC 3 informal sectors, own account sector and NOE activities sector, see table below.

Table 5.2: Manufacturing informal sector, small-scale sector and NOE activities for 2016 year (R' million)

	Use table 10 x 10 published P0441 GDP 1st quarter 2016	Supply and use table 64 x 105 condensed to 10 x 10 use table	Difference between two tables reflects the manufacturing NOE sector
Intermediate consumption	1 524 246	1 509 197	15 049
Total gross value added	523 785	510 971	12 814
Total output at basic prices	2 048 031	2 020 168	27 863

Source: Statistics South Africa (release No. P0441, 4ther quarter 2017)

Table 5.2 represents the 2016 data that is allocated to the informal manufacturing sector, small-scale manufacturing sector and illegal manufacturing activities. This current manufacturing informal, small and illegal activities IC, value added and output data is compared under point 5.2.5 with the new estimates of the informal manufacturing sector, small-scale manufacturing sector and the illegal manufacturing activities for 2016.

The following section represents the new calculation of the informal manufacturing sector, small-scale manufacturing sector and the illegal manufacturing activities for the reference years 2011 and 2016.

5.2.3 New calculations of the manufacturing sector informal, small-scale and illegal activities (SIC 3)

The discussion in this section includes the informal, small-scale manufacturing sector and illegal activities. The 2008 SNA: 63 indicates that households can engage in production activities, but these are relatively small in scale and can therefore be classified as subsistence activities/small-scale and informal manufacturing activities. The South African scenario consists of the small-scale manufacturing (SSM) sector and the informal sector. To determine the informal sector and the small-scale sector value added, the characteristics of the 2008 SNA that are in line with the international standards for national accountants are used. These characteristics are also discussed in Chapter 2.

The SSM sector comprises those enterprises that have a full set of financial accounts but are still small in scale and are not registered for any tax. These enterprises are registered at the Department of Trade and Industry (DTI) with a formal name. These small-scale enterprises are enterprises that have less than R300 000 turnover. An SSM business has a normal payroll with fewer than 10 employees and is therefore classified as a micro or small business.

The informal sector is defined as businesses that have no set of formal accounts, and that normally comprises of own-account workers and people that assist in family businesses with no remuneration (mentioned as in-kind remuneration).

The research follows a quantitative study that is more observational in nature. Already published data by Statistics South Africa is analysed. The published data that is used, is discussed under the respective headings. Data that pertains to both the SSM and informal sectors is obtained by means of household surveys, meaning that data is obtained from households themselves by doing a door-to-door survey.

5.2.3.1 Informal sector

To determine the informal sector output, the number of employees is multiplied by the average salaries that employees receive in the manufacturing sector. As data is not available for IC, the ratio of the formal manufacturing sector IC towards output is calculated and it is applied to the informal sector; thus, intermediate consumption (IC): Output. Value added is determined by output minus intermediate consumption.

Output is calculated by the number of employees multiplied by the average salaries received per annum divided by R' million to obtain earnings of informal employees. The number of employees is obtained from the Statistics South Africa publication (2018:56), Release No. P0211, *Quarterly labour force survey*, Table 3.3. As this publication is a quarterly publication, the average number of employees is taken over the period of the four quarters. The average salary of the employees of the specific reference year is obtained from Statistics South Africa, Release No. P0277, *Quarterly employment statistics*, Table G. The salary is calculated by taking the average salaries of the four quarters. Thus, the output for 2011 is 226 225 (average number of employees) multiplied by R10 837 (average monthly earnings) multiplied by 12 (to obtain annual salary) divided by R' million, equals R29 419. The IC is calculated by using the same ratio of the IC (informal and NOE activity sector)

towards the output of the informal and NOE activity sector that is reflected in Table 5.1. Determining the manufacturing IC, the ratio of IC to output is used - this is 35%. IC is 35% of R29 419, equals R10 296. Value added is output minus intermediate consumption.

The output for 2016 is 197 805 (average number of employees) multiplied by R15 158 (average monthly earnings) multiplied by 12 (to obtain annual salary) divided by R million, equals R35 979. The IC is calculated by using the ratio of the IC (informal and NOE activity sector) towards the output of the informal and NOE activity sector that is reflected in the 64 x 105 (2014) statistical release. IC represents 34,7% towards the output. IC is 34,7% of R35 979, which equals R12 484. Value added is output minus intermediate consumption. The results of both years (2011 and 2016) are reflected in Table 5.3.

Table 5.3: Measuring the informal sector value added of SIC 3 for reference period 2011 and 2016 (R' million)

	2011	2016
Intermediate consumption	10 296	12 484
Total gross value added	19 123	23 495
Total output at basic prices	29 419	35 979

Source: Statistics South Africa release No. P0441

The value added for the 2011 and 2016 calendar years is calculated as R19 123 million and R23 495 million respectively. The results of Table 5.4 are added to the total NOE activities and informal sector, and form part of the total newly calculated amounts for the manufacturing sector.

5.2.3.2 Small manufacturing business sector

The SSM sector is difficult to measure because data published by Statistics South Africa is limited. The Statistics South Africa definition of small-scale manufacturing businesses is not clear, specifically in terms of which businesses are included in this sector, which small scale businesses should be excluded, and if the small-scale business definition is based on turnover. According to the data in the Statistics South Africa (2013:3) Release No. P0276, *Survey of Employers and the Self-Employed (SESE)*, the informal sector includes the SSM sector. According to the SESE (Statistics South Africa, 2013:3), the discussion of this release focuses on non-VAT registered businesses. The Statistics South Africa SESE (2013:5-7) publication indicates that 4,3% of the working population works in non-VAT registered businesses.

Furthermore, the Statistics South Africa SESE publication (2013:8) takes certain characteristics into consideration, for example, that people running a non-VAT registered business have running water and toilet, telephone and electricity facilities. It is therefore clear that it does not include the above informal sector, because if one considers the purely informal sector (e.g. vendors on the street), these businesses do not have the aforementioned facilities. According to international standards (2008 SNA: 479), non-VAT registered businesses should have some form of record-keeping. Table 9 in the Statistics South Africa SESE publication (2013:8) indicates that 24,3% of non-VAT registered businesses have some form of record-keeping, and therefore the assumption is made that only businesses that can render proof of some financial record-keeping form part of the self-employed (Figure 9: SESE, 2013:8).

In this release (SESE), Excel table 17 indicates that 112 000 people run non-VAT registered businesses. When considering the characteristics of self-employment, the number of people who own non-VAT registered businesses and who are self-employed is 112 000, multiplied by 24,3%; thus, 27 216 employees are self-employed. It should be noted that the latest data provided by Statistics South Africa is available for 2013 only. To determine the figures for 2011 and 2016, three methods can be used. Firstly, the number of self-employed persons can be adjusted by the unemployment growth rate from 2011 to 2016. The second method is to use the growth rate of the manufacturing sector. Lastly, the number of self-employed persons can be kept stagnant, and the salary can be adjusted in accordance with data published by Statistics South Africa in Release No. P0277, *Quarterly employment statistics* (QES) (2018:30), Table F. For the purposes of this research, the last assumption is used because the unemployment growth rate does not differ a lot, but the salary increased over time.

To determine the output of self-employed owners, the number of self-employed owners (27 216) is multiplied by the earnings received. To determine the earnings, the same methodology used for the informal sector is applied. The salary data is obtained from the Statistics South Africa release, *Quarterly employment statistics,* (release No. P0277:30), Table F. According to the remuneration data (for 2011 and 2016) published in this release, the average earnings per month are R10 837 (2011) and R14 226 (2016). This is multiplied by 12 to obtain yearly earnings, which amount to R130 044 per annum for 2011 and R181 891 per annum for 2016. These amounts are divided by R million, as data for 2011 and 2016 is reflected as R million.

Intermediate consumption (IC) is calculated by taking the IC ratio to output an IC of 35% (2011) and 34,7% (2016). Value added is output minus IC.

Table 5.4: Measuring small-scale manufacturing businesses value added for 2011 and 2016 years (R' million)

Year	2011	2016
Intermediate consumption	1 238	1 612
Total gross value added	2 300	3 033
Total output at basic prices	3 539	4 646

Source: Statistics South Africa release No P0277

When all assumptions and methodology are taken into consideration, the total informal sector and SSM value added for 2011 amounts to R2 300 million, and for 2016, it amounts to R3 033 million. This value added is added to the informal sector to determine the total informal sector in line with the SNA: 471 guidelines. The following section measures illegal activities.

5.2.3.3 Illegal manufacturing sector

The 2008 SNA: 48 indicates that illegal transactions should be treated the same as legal transactions, as these are a mutual agreement between parties to manufacture products. The output forms part of the production process and should be recorded in national accounts. For illegal activities, the Department of Trade and Industry (dti) annually publishes a list of products that are prohibited from being imported. These publications are aimed at reducing illegal manufacturing of goods, but actually it increases the illegal manufacturing of goods. The biggest problem with illegally manufactured goods is that products enter the markets at a lower price than the current price, and the biggest concern is that these products contribute towards the loss of tax revenue and increase job losses at formal manufacturers. Some examples of illegal manufacturing of goods include the production of clothing and textiles, cigarettes, pharmaceutical products, gold and related items such as jewellery, underground dental activities, etc.

5.2.3.3.1 Illegal manufacturing of tobacco

Illegal manufacturing of tobacco is defined as the supply of smuggled or counterfeit tobacco products to avoid paying taxes[47] (Tobacco statistics 2016/2017 tax year). According to the Eurostat (2018:38)

[47] http://www.tobaccosa.co.za/illicit-trade/what-is-illicit-trade/

publication, the method used to determine the illegal manufacturing of tobacco is to use the volume involved. In this regard, the Tobacco Institute of Southern Africa (TISA) provides some data on the percentage of illegal production in South Africa. TISA indicates that 23% of cigarettes smoked in South Africa are illegal.

In 2011, the market for the illicit manufacturing of cigarettes equalled 8 280 million sticks. There is a lack of 2016 data, and in order to determine figures for 2016, the average growth rate of the manufacturing is taken into account. The average growth rate since 2011 is around 6%, although the likelihood exists that it is much higher. If the growth rate from 2011 to 2016 is taken into consideration, the number of sticks manufactured amounts to 10 720 million sticks.

According to TISA, the production costs in 2011 for a packet of cigarettes (20) amounted to R3.77; thus, R0.18 per cigarette. This is supported by British American Tobacco SA (BATSA) that uses R3.80 per packet (20) of cigarettes. If these figures are taken into consideration, the production cost in 2011 per stick amounted to approximately R0.18 per stick. To determine the production cost of cigarettes per stick for 2016, the manufacturing growth rate is considered; thus, the manufacturing cost per stick for 2016 amounted to R0.23 per stick. It is difficult to determine the "gate price" of illegal production. The goods are sold to one person, who then sells it to the middleman. The person who buys it directly from the manufacturer is not added, as it is seen as part of trade, and is accordingly recorded under trade.

The output is calculated by the number in sticks (already in millions) multiplied by the price. The price excludes taxes, trade margins and transport margins. The 2011 output results in 8 280 million sticks multiplied by R0.18 equals R1 490 million, and for 2016, the results are 10 720 million sticks multiplied by R0.23 equals R2 465 million. Intermediate consumption is based on the same percentage ratio, IC to output for 2011 (35%) and 2016 (34,7%). Value added is output minus intermediate consumption.

Table 5.5: Measuring the illegal manufacturing of tobacco value added for 2011 and 2016 (R' million)

	Output	Intermediate consumption	Value added
2011	1 490	521	969
2016	2 465	855	1 610

Source: TISA

Table 5.5 measures the value added of illicit cigarette production. The calculation meets the objective mentioned in the framework discussion of the thesis: to bring it in line with international guidelines. Another aspect of illegal activities is the illegal manufacturing of alcohol.

5.2.3.3.2 Illegal manufacturing of alcohol

According to the World Health Organization (WHO), illegal manufacturing of alcohol is defined as unrecorded alcohol manufacturing outside the controlling channels of government that is not taxed because the distribution, production and selling thereof is illegal. Unrecorded alcohol manufacturing includes homemade alcohol or illegally produced alcohol, smuggling of alcohol for medical purposes and alcohol obtained through cross-border shopping. The Eurostat (2018:38), defines illegal production of alcohol as the brewing of beer and alcohol by households, but does not go into specific detail on how to measure the illegal side. The international guidelines do mention that volumes can be used as a baseline. According to the OECD publication, no specific guidelines are set out on how to measure the illegal manufacturing of alcohol; thus, the assumption is applied that it is country-specific and should be handled accordingly. Furthermore, the characteristics of illegal activities as mentioned in Chapter 2 of the 2008 SNA are taken into account.

To obtain data on the illegal manufacturing of alcohol, several publications are used. Firstly, in order to determine the output of alcohol manufacturing, the Statistics South Africa release *Living conditions of households in South Africa 2014/2015* (Release No. P0310:3) is used. This release indicates the total amount spent by households on alcohol. The total expenditure of households measures the portion applicable to alcohol used by households in rand value. Household expenditure on alcohol equalled R1 716 595 million in 2015, and R1 555 013 million in 2011. To determine data for 2016, an assumption is made to use the manufacturing growth rate as base to determine the data for 2016. The growth rate of 4,7% from 2015 to 2016 is used; thus, the total household expenditure amounts to R1 797 743 for 2016 on alcohol. The second publication to be consulted is that of Fieldgate et al. (2013), *Economic impact of an advertising ban on alcoholic beverages for sector association for responsible alcohol use* (2013:31, Table 12), which indicates that 2,7% of household expenditure is allocated to alcohol. Thus, alcohol expenditure amounted to R48 539 million (2016) and R41 985 million (2011) of total household expenditure. The third publication used is that of the WHO (2011:23), *Global status report on alcohol and health* (WHO, 2011:23), which found that the South African adult per capita alcohol consumption (APC) in 2005 was equal to 9.5 litres of pure alcohol; of

this, 2.5 litres (26,3%)[48] was homemade, and thus part of illegal manufacturing. The same percentage of illegal consumption is used for 2011 and 2016.

In order to determine the output of illegal manufacturing of alcohol, the above three published documents are used to calculate the illegal part of alcohol consumption. Output for illegal consumption for 2011 amounts to R1 555 013 million multiplied by 2,7% (household expenditure on alcohol) equals R41 985. Of this amount, 26,3% is illegal. Output for 2011 equals R11 042. Output for illegal consumption for 2016 amounts to R1 797 743 million multiplied by 2,7% (household expenditure on alcohol) equals R48 539. Of this amount, 26,3% is illegal. Output for 2016 equals R12 766.

Measuring the intermediate consumption is a more difficult task as no clear guidelines are set by either the 2008 SNA, OECD or the Eurostat publication (2018:38). According to a report by the WHO, *Best practice in estimating the cost of alcohol – recommendations for future studies* (WHO, 2010:36), the cost can implicate health and social cost, labour and input cost, and non-financial welfare. In this case, we are looking at input cost to determine the intermediate consumption. Input cost has little capital expenditure and does not require a lot of labour. In the South African rural areas where local beer is produced, little start-up cost is needed, although more start-up cost is needed when starting a micro business. The assumption is that 10% of output is IC, this can be overestimated as in a discussion on brewery start-up cost, "Advice on my cost, expense, and profit projections" (2017)[49] the cost on a home brewery is between 2% to 4%.

Value added is measured by taking output minus intermediate consumption, which equals value added.

Table 5.6: Measurement of illegal value added on alcohol production for 2011 and 2016 (R' million)

Year	Output R' million	Intermediate consumption R' million	Value added R' million
2011	11 042	1 104[50]	9 938
2016	13 457	1 345	12 112

[48] http://www.dti.gov.za/business_regulation/docs/nla/economic-impact-of-an-adban.pdf
[49] https://discussions.probrewer.com/showthread.php?69012-Brewery-Startup-Advice-on-my-Cost-Expense-and-Profit-Projections
[50] Assumption of 10% intermediate consumption has little expenses, use own property, thus no renting cost, no labour – own labour.

The steady growth between 2011 and 2016 with respect to illegal alcohol production is an underestimation. The report by the International Centre for Alcohol Policies (ICAP), 206 report No. 17 indicates that in most African countries, illegal alcohol production amounted to 50%. In this scenario, only 26,3% is used - that is well below the mentioned percentage by ICAP.

According to Table 5.6, the illicit value added for 2011 is R9 938 million and for 2016 it amounts to R12 112 million. This forms part of the illegal manufacturing sector. A further manufactured product is the illegal production of copies, audio and video material and internet usage, which is discussed in the following section.

5.2.3.3.3 Illegal production of copies, audio and video material and internet usage

This is one of the most difficult sectors to determine, as very little literature reviews and research exist. According to the international standards guideline (OECD 2002:156), illegal activities are difficult to measure, but the OECD does state that as far as possible, these should be reported because they form part of the activities within the boundaries of South Africa. The biggest problem is that limited statistics exist in the case of authorised organisations, such as the Southern African Federation against Copyright Theft (SAFACT) and the BSA (formerly the Business Software Alliance). The methodology encountered relies on published news reports and limited statistics by SAFACT and BSA. Some statistics were obtained through media releases that SAFACT released, but lacked concrete evidence and literature reviews.

SAFACT defines piracy as the breach of trademarks and copyrights of all products related to software. Illicit copies consist of counterfeit products such as PC software products that are downloaded without legal licences, copies of movies, copies of games, and illegal streaming. Illegal copies of a product consist of piracy, counterfeit products, bootlegs, internet piracy and PC software copying. Piracy is defined as a duplication of original material without the agreement of the rights of the owner. It can also be copies and packaging of originally produced music as closely as possible to the original product. Bootlegging is defined as recording of live music, duplication of it and the selling of the fake products.[51] Internet piracy is music that is posted on the internet without payment to the investor of the product and illicit streaming. PC software copying is the copying of PC software without paying the licence fee, e.g. any software illegally loaded on a PC.

[51]http://www.risa.org.za/anti-piracy/

Statistics available by SAFACT indicate that the estimated annual loss to the local music sector due to piracy is in the region of R7,540 million[52] (2015). A dti media statement (2013), *Call on consumers to boycott pirated goods* [53], indicates that several counterfeit DVDs and CDs are confiscated with the value of R671 million daily in 26 busts. If this is daily, the amount estimated by the dti it is much higher than the R7 540 million in 2015 reported by SAFACT. The methodology used to measure the years 2011 and 2016, is based on the entertainment and media segment report published by SAFACT (2017:4), *Entertainment and media outlook: 2017 – 2021 An African perspective*, "An in-depth analysis of the trends shaping the entertainment and media sector in South Africa, Nigeria, Kenya, Ghana and Tanzania, 8th annual edition". In order to calculate the value of counterfeit CDs and DVDs, the year-on-year growth rate of music, TV and video games based on the 2015 year is used. The growth rates are calculated backwards for 2011, and forwards to determine the value for 2016. By using these growth rates, the value of illegal CD and DVD production amounted to R5 585 million for 2011 and R7 957 million for 2016.

Measuring illicit book piracy and movie piracy – A article of Havocscope global black-market information indicates that in 2014, book piracy and movie piracy added up to approximately R9 817 million ($755 million). The methodology to calculate the 2011 and 2016 reference years is based on the SAFACT (2014) report. This report of SAFACT (2017:4), *Entertainment and media outlook: 2017 – 2021 An African perspective*, "An in-depth analysis of the trends shaping the entertainment and media sector in South Africa, Nigeria, Kenya, Ghana and Tanzania, 8th annual edition" is used to determine the growth rate between years, taking 2014 as the base year. To calculate the value of counterfeit book piracy and movie piracy, the year-on-year growth rate of cinemas and magazines based on the 2014 year is used. The growth rates are calculated backwards for 2011 and forwards to determine the value for 2016. By using these growth rates, the value of book piracy and movie piracy production amounted to R8 693 million for 2011 and R10 072 million for 2016.

Measuring illicit software piracy products – Piracy software production is considered one of the fastest growing illicit businesses. This includes illegal streaming, illegal software packages on PC, illegal downloading from the internet, and online playing of games illegally. According to an article of Malczyk (2010:1), "*Games, copyright, piracy: South African gamers' perspectives"*, the author found that 70% of people playing games on the internet share the content illegally. From 2011 to 2016, a

[52] https://mybroadband.co.za/news/technology/119234-south-african-movie-music-piracy-labs-busted-here-they-are.html
[53] http://www.dti.gov.za/editmedia.jsp?id=2908

steep increase in illegal usage of software products by business- and home-use is notable. The percentage increase is between 10% and 20% year-on-year. The Havocscope global black market information indicates that South African software piracy products amounted to R6 542 million ($564) in 2014. A report by BSA indicates that South African citizens spend R4 300 million[54] on unlicensed software PC products. For this discussion, R6 542 million is taken into account. The methodology to calculate the 2011 and 2016 reference years is based on the SAFACT (2014) report. This report of SAFACT (2017:4), is used to determine the growth rate between years, taking 2014 as the base year. To calculate the value of counterfeit software piracy, the year-on-year growth rate of "business-to-business", internet and "out-of-home" internet, based on the 2014 year, is used. The growth rates are calculated backwards for 2011 and forwards to determine the value for 2016. By using these growth rates, the value of book piracy and movie piracy production amounted to R3 585 million for 2011 and R7 959 million for 2016.

To determine the output, the previous three illegal products are taken into account for the two-year encounter.

Table 5.7: Measurement output of illegal production of copies, audio, video material and internet usage (R' million)

Year	Copying of CDs and DVDs	Book piracy and movie piracy	Software illegal usage	Total output
2011	5 585	8 693	3 585	17 863
2016	7 957	10 072	7 959	25 988

Table 5.7 only represents the output. To determine the total value of manufacturing the IC is more complex, because common knowledge tells us that illegal downloading from the internet does not cost a person anything, while copying of movies and CDs can be approximately 1%. The assumption of 1% IC is used. It can be argued that the IC is too low, but it should be noted that the cost is borne by the actual legal manufacturer of the product or the person who owns the property right.

Further illegal activities that are not included, are usage of unlicensed TVs, copying of books by taking pictures or photocopying books, the production of fake qualifications, etc.; thus, the likelihood does exist that this sector is underestimated. Value added is calculated by output minus IC.

[54] https://techcentral.co.za/a-third-of-software-in-sa-is-pirated/65578/

Table 5.8: Measurement of the value added of illegal production of copies, audio, video material and internet usage (R' million)

Year	Output	Intermediate consumption	Value added
2011	17 863	178	17 684
2016	25 988	259	25 728

When measuring the value added (Table 5.8), it can be argued that the amounts of R17 684 million (2011) and R25 728 million (2016) are too high. A study by Thatcher and Mathew (2012:12), *Comparing software piracy in South Africa and Zambia using social cognitive theory*, found that piracy is about 35% in South Africa. When taking the SAFACT (2017:4) "*Entertainment and media outlook: 2017 – 2021*" report into consideration, the actual spending on total media is R79 342 million (2011) and R135 276 million (2016). Calculate R79 342 multiplied by 35% equals R27 769 million (2011) and R47 346 million (2016); thus, it is most likely that the amount reflected in Table 5.6 is still underestimated.

5.2.3.3.4 Manufacturing of drugs

To define drugs, the pilot study of the OECD (2018:35) are used where it refers to drugs as "cannabis, ecstasy, amphetamines, cocaine and heroin and in some counties LSD and medicine". Although cannabis is now being sold everywhere, it must be borne in mind that this research covers calendar years 2011 and 2016. During this period cannabis was still seen as illegal drug.

According to the OECD (2002:156) publication, the production of drugs can be measured by taking into account police data on seizures or estimations on relevant confiscations. The SAPS only provides data with regard to drug related crimes and not drug seizures. A second method is to calculate the manufacturing sector by supply and demand. In South Africa, supply and demand methodology is difficult to use because of the illegality of the activity and unavailability of SAPS data. The OECD (2002:156) further recommends that the domestic consumption data can be useful to estimate the number of people addicted, and to multiply it with the average quantity of usages per day. This is the most reliable methodology which is discussed below.

To calculate the output involves four steps: Firstly, take the population size and determine the number of people using drugs. The size of the population is obtained from the Statistics South Africa

Release No. P0302, *Mid-year population estimates* (2018) which estimates the population size at 51,73 million for 2011 and 55,91 million for 2016 (see Table 5.8).

Table 5.9: Mid-year population estimates (million)

2011	2012	2013	2014	2015	2016
51,73	52,51	53,31	54,15	55,01	55,91

Source: Statistics South Africa release No P0302

The second step is to take the number of people using drugs into consideration. In this regard, an article by Reagon (2016), *Latest Drug Use Statistics – South Africa 2016,* based on the UN report, 3,74 million (2013) people are using some kind of drug. Determine manufacturing the 2011 and 2016 years are based on the population growth as starting point of 2013. Thus, the population using drugs are 3,6 million (2011) and 3,9 million (2016).

Table 5.10: Total population using drug in South Africa (million)

	% usage of drugs	2011	2012	2013	2014	2015	2016
Total population using drugs		3,63	3,68	3,74	3,80	3,86	3,92

Thirdly, the percentage of the population using specific drugs needs to be determined. The assumption is that people who use drugs obtain it illegally, thus the supply (manufacturing) is illegal. According to the UN World Drug Report (2014), "*Drug use statistics in South Africa"*, the largest drug use is cannabis at 38,4%, followed by Methamphetamines (22,9%), while heroin usage is at 18,8%. The population using a specific drug (table 5.11) is calculated by taking the population using drugs and multiplying this by the specific drug, which equals the number of people using the specific drugs, e.g. in 2011, a total of 3,63 million people were involved in drug usage, multiplied by the type of drug percentage (cannabis 38,4%), equals 1,39 million people who used cannabis.

Table 5.11: Total population (million) using drugs in South Africa

	% usage of drugs	2011	2012	2013	2014	2015	2016
Total population using drugs		3,63	3,68	3,74	3,80	3,86	3,92
Cannabis	38,4	1,39	1,41	1,44	1,46	1,48	1,51
Other	5,3	0,19	0,20	0,20	0,20	0,20	0,21
Hallucinogens (XTC or LSD)	3,2	0,12	0,12	0,12	0,12	0,12	0,13
Ecstasy	0,3	0,01	0,01	0,01	0,01	0,01	0,01
Methamphetamines	22,9	0,83	0,84	0,86	0,87	0,88	0,90

Cocaine	5,7	0,21	0,21	0,21	0,22	0,22	0,22
Heroin	18,8	0,68	0,69	0,70	0,71	0,73	0,74
Prescription stimulants	5,4	0,20	0,20	0,20	0,21	0,21	0,21

Source: Statistics South Africa (population size); UN report (usage of drugs)

The fourth step is to calculate the output, which is the price of a specific drug. This is more complex as prices differ in the various areas, e.g. rural, urban and provincial (UCT:2015). For the purposes of this discussion, an average price is used for the manufacturing, and no mark-up is taken into account; this reduces the risk of double counting, and the mark-up of the drug is seen as illegal trade and reflects under the trade sector.

Prices are obtained from a study by Howell et al. (2015), *the wrong type of decline: Fluctuation in price and value of illegal substances in Cape Town*. In this discussion, the lowest price is used for manufacturing. In the trade sector, the mean price is used for mark-up, and the prices in the discussion are compared to a study by Peltzer et al. (2011). The prices are multiplied by the number of the population using the specific drug multiplied by the number of usage per day. The assumption is that most of the population use the kind of drug twice a day.

Table 5.12: Measuring the output of drugs manufacturing (R' million)

	% usage of drugs	Price of drugs (rand)	Population usage of drugs 2011 (million)	Population usage of drugs 2016 (million)	Total output in 2011 R' million	Total output in 2016 R' million
Total population using drugs			3,63	3,92		
Cannabis	38,4	120,00	1,39	1,51	167,23	180,74
Other	5,3	65,00	0,19	0,21	12,50	13,51
Hallucinogens (XTC or LSD)	3,2	80,00	0,12	0,13	9,29	10,04
Ecstasy	0,3	50,00	0,01	0,01	0,54	0,59
Methamphetamines	22,9	324,00	0,83	0,90	269,27	291,03
Cocaine	5,7	120,00	0,21	0,22	24,82	26,83
Heroin	18,8	600,00	0,68	0,74	409,37	442,45
Prescription stimulants	5,4	65,00	0,20	0,21	12,74	13,77
Total amount of drugs used (R' million)					**905,77**	**978,96**

Source (UCT): Prices and Statistics South Africa: population size

It can be argued that the prices in Table 5.12 are overestimated, but the counter argument is also true, i.e. that the lowest price is considered. Furthermore, the prices for the two years are stagnant and no adjustments have been made; thus, it rules out the argument that the prices are too high.

The measure of the intermediate consumption (IC) is based on the ratio IC to output reflected in the release P0411, where the NOE and informal sector represent 35% taking the ratio of IC to output in 2011. The measure of the 2016 intermediate consumption (IC) is based on the ratio IC to output it represent 34,7%.

Table 5.13: Measuring value added for illegal drugs manufacturing for 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011	906	317	589
2016	978	339	639

If the above assumption is taken into consideration, and as discussed under the manufacturing of drugs, the value added reflects R589 million for 2011 and R639 million for 2016. Table 5.15 adds all the informal manufacturing, illegal manufacturing and small-scale manufacturing together for the two reference periods, i.e. 2011 and 2016.

5.2.4 New estimation of informal and illegal manufacturing sector (SIC 3)

This section reflects two datasets – one for the reference period 2011 and the other for the reference period 2016. Table 5.15 indicates the value of total output, intermediate consumption and the value added separately, and includes the total sector (SIC 3) illegal activities, SSM sector and informal sector.

Table 5.14: Total informal sector and illegal activities for SIC 3 reference period 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011	64 259	13 654	50 603
2016	83 513	16 894	66 617

When all of the above values are taken into consideration, the likelihood still exists that the value added of this sector is underestimated. The main reason for this is that some illegal activities are still not reflected, such as illegal dental laboratories, production of illegal gold products, etc.

According to a news report, *Illegal denture lab bust* (2017),[55] a lab was busted in the Western Cape, but the actual value of illegal manufacturing products was not mentioned. In an article of Pillay (2013:1), *the outsourcing of dental prosthesis in Gauteng*, most of the prosthesis are outsourced without a formal contract between the dentist and the laboratory, as contracts are verbal agreements between the dentist and technicians. The technicians consult with patients, in arrangement with dentists, but this activity is an illegal practice. The size of this illegal activity is unknown. A further reason for undercounting is the illegal manufacturing of pharmaceutical products. According to the WHO (2005) article, *Pharmaceuticals: Counterfeit, substandard drugs and drug diversion*, illegal trade has increased dramatically in developing countries because of the financial gain traders get out of it.[56] Table 5.15 reflects the measuring of informal sector, small-scale manufacturing sector and a portion of illegal manufacturing activities.

This is just a small portion of illegal activities in the manufacturing sector.

5.2.5 Evaluation of published data against newly calculated estimates for the manufacturing sector

To determine the over-/underestimation for the reference years 2011 and 2016, the new estimates are analysed against the current published data for each year. Table 5.15 reflects the over-/ underestimation of the manufacturing sector (SIC 3) for 2011.

Table 5.15: Total informal sector and illegal activities for the reference period 2011 (R' million)

	Total published formal, informal, NOE of SIC 3	New estimation of formal, informal, NOE SIC 3 sector	Over-/underestimation of the manufacturing sector (SIC 3)
Intermediate consumption	14 653	13 654	999
Total gross value added	8 803	50 603	-41 773
Total output at basic prices	23 483	64 259	-40 776

From the above table, it is clear that the value added for the period 2011 is underestimated by R41 773 million. The contribution made by the manufacturing sector to the total economy growth is therefore underestimated.

Intermediate consumption is overestimated by R999 million - the reasons are that the exact methodology from Statistics South Africa with regard to calculation on IC, value added and output

[55] https://www.news24.com/SouthAfrica/Local/Peoples-Post/denture-lab-found-20171127
[56] http://apps.who.int/medicinedocs/documents/s16755e/s16755e.pdf

are unknown. Secondly, it is unknown if all latest international guidelines are implemented by Statistics South Africa.

As for 2016, total over-/underestimation of the manufacturing sector (SIC 3) informal sector, SSM and illegal activities is determined in the same way as for 2011. The new estimations are evaluated against the already published data. This is shown in Table 5.16.

Table 5.16: Total NOE of SIC 3 reference period 2016 (R' million)

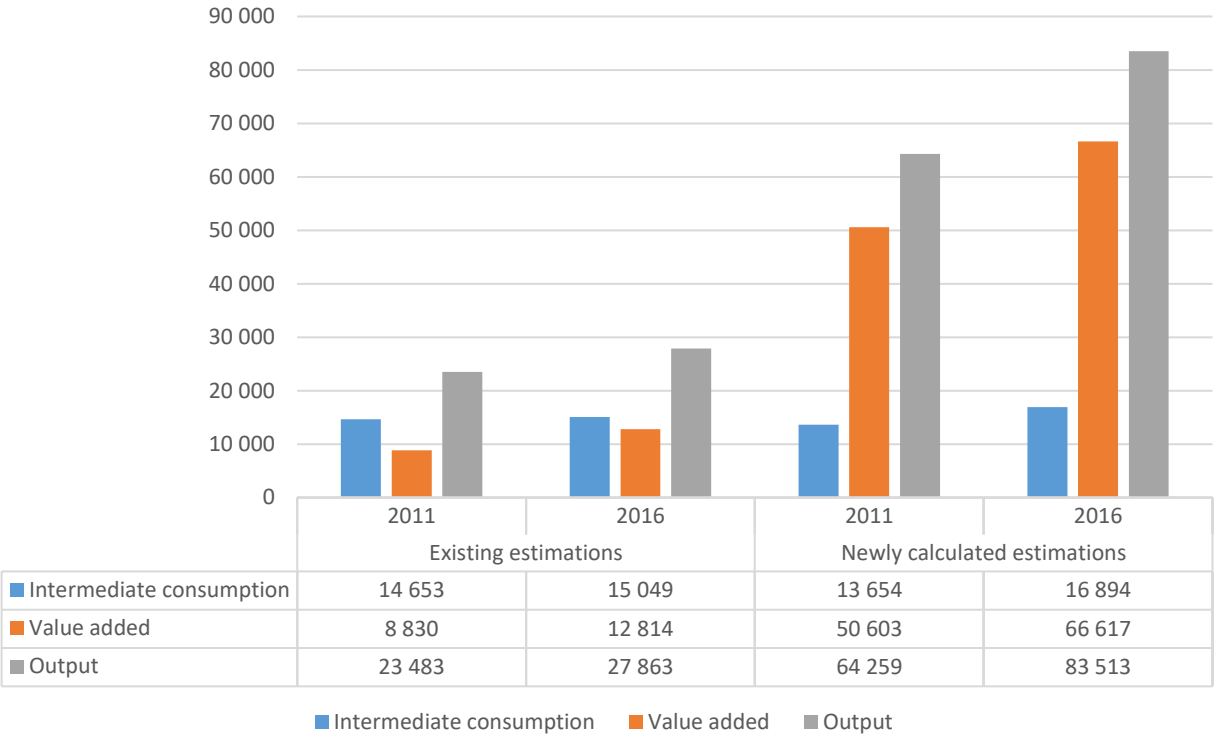
	Total published formal, informal, NOE of SIC 3	Current estimation of formal, informal, NOE SIC 3 sector	Over-/under-estimation of the manufacturing sector (SIC 3)
Intermediate consumption	15 049	16 894	-1 845
Total gross value added	12 814	66 617	-53 803
Total output at basic prices	27 863	83 513	-55 650

From the above table, it is clear that the value added for the period 2016 is underestimated by R53 803 million for SIC 3; thus, it results in an underestimation of the total GDP. The counter-argument could be that the intermediate cost is overestimated but the discussion shows exactly how IC is determined, although the published data does not explain the methodology.

5.2.6 Gap between existing published calculations and newly estimations of the manufacturing sector

This section illustrates by means of a graph the differences of current published data against the newly estimations for 2011 and 2016. Secondly it explains the reasons why data differs and limitations exist. Lastly, some recommendations are made on how to close the gap between new calculations and published data, annually.

Graph 5.1: The gap between the newly NOE sector of SIC 3 compared to the current estimates of the NOE sector for the calendar years 2011 and 2016



	2011	2016	2011	2016
	Existing estimations		Newly calculated estimations	
Intermediate consumption	14 653	15 049	13 654	16 894
Value added	8 830	12 814	50 603	66 617
Output	23 483	27 863	64 259	83 513

Graph 5.1 illustrates the gap between the current data and newly calculated informal manufacturing sector, small scale manufacturing sector and illegal manufacturing activities. Some of the reasons which cause the gap between the current estimations and the new estimates are firstly, not all characteristics of the 2008 SNA were considered when data was published by Statistics South Africa in the GDP release (P0441). This is also verified by Statistics South Africa Report No. 04-04-03 (2010), where it is mentioned that the 2008 SNA was "partially implemented".

Secondly, the new calculations include the latest international guidelines on how to determine the informal sector and NOE activity, such as the 2008 SNA, Eurostat (2018) and OECD (2002) guidelines. It is not clearly indicated which international guidelines are implemented in the current estimations; the only guideline mentioned by Statistics South Africa is the 2008 SNA.

To avoid confusion around the methodology in use, it is explained how to measure the informal sector, own account sector and NOE activities of SIC 3 in the new calculations whereas the methodology is not clearly explained in the current estimates by Statistics South Africa, Release No. P0441, "*Gross domestic product (GDP)*".

Furthermore, it is acknowledged by the researcher that a gap can exist because of data limitation, especially with regard to the lack of SAPS data on the illegal manufacturing of goods. Limited research exists on illegal manufacturing production cost and turnover. Data on all illegal production e.g. dental, pharmaceutical products etc. is non-existent, in this regard only news articles are available.

The gap between the newly estimates and the existing published current estimates can be reduced firstly, if the methodology is explained in the Statistics South Africa Release P0441 on how the informal and illegal activities are calculated. The manufacturing sector informal and illegal activities are shown as part of the manufacturing sector and not as one column for all the sector's informal and illegal activities. Statistics South Africa can clarify international guidelines, definitions and characteristics in use to determine this sector's informal and illegal activities.

5.2.7 Concluding remarks

The results of both years indicate an underestimation of IC, value added and output. The reason for this can be that not all characteristics of the 2008 SNA were taken into account when data was published by Statistics South Africa in the GDP release (P0441). As mentioned in Statistics South Africa Report No. D0409, the 2008 SNA was "partially implemented". Furthermore, the value added is underestimated, and this has an impact on the total GDP of the country. The current finding indicates that the sector size is underestimated, taking value added into consideration. The new calculations are in line with international guidelines, and lastly, national accountants can follow the methodology to determine the informal sector, small-scale activities and non-observed activities. The objective of this research, as far as the manufacturing sector is concerned, has been achieved in as much as it can be, taking into consideration that limited data is available. The final results are shown in Chapter 7, where all the sectors are added together to determine the over-/underestimation of the entire economy.

The following section discusses the electricity and water sector and consists of the formal sector, informal electricity and water sector and illegal electricity and water sector.

5.3 THE NON-OBSERVED ELECTRICITY, GAS AND WATER SUPPLY SECTOR (SIC 4)

5.3.1 Introduction

As indicated in the introduction paragraph, 5.1, the electricity, gas and water supply sector forms part of the secondary sector. These sub-sector includes the production, distribution and collection of electricity (SIC 41), the manufacturing of gas (SIC 412), and steam of hot water supply (SIC 413).

In terms of the research problem formulated for the purposes of this study and the conceptual framework shown above, the question to answer is if the electricity, gas and water supply sector total size is accounted for in the GDP. Is the total size of SIC 4 covered or is the sector over-/underestimated, taking all parameters into consideration such as formal activities, informal activities and illegal activities. Although the objective indicates that no sub-sectors are measured in this sector (SIC 4), it is measured because the illegal/grey and underground activity of electricity and water are measured differently; this ensures that the total SIC 4 are accounted for.

The outline of the electricity and water sector discussion consists of the current estimations, followed by the newly estimations, total measurements of the illegal and informal activities, the evaluation between the current estimates and the new estimates and lastly, the limitations encountered when measuring the informal sector, small scale electricity and water and NOE activities, and a final conclusion.

5.3.2 Current estimation of value added in statistical release published by Stats SA

In order to determine the current size of the electricity and water sector, the SIC is taken into account. According to the Standard Industrial Classification (SIC), the electricity and water sector comprises of electricity (SIC 411), gas (SIC 412) and water supply (SIC 413). In order to measure the size of the electricity and water sector, the following formula is considered:

SIC 4 = Electricity, gas and water sector (Formal electricity, gas and water sector + informal electricity, gas and water sector electricity sector + illegal electricity sector + illegal water connections)

Taking the size of the electricity and water sector formula into consideration, the existing estimates for the electricity and water sector are obtained from two statistical releases. Firstly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP) 1st quarter 2016*", the table in use is GDP annual and regional Table 2016, worksheet "SUT 2011"; this represents a 10 x 10 supply and use

table. Secondly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP)" 4th quarter 2014*", the table in use is Tables 4th quarter 2014.xls, worksheet "Use table 2011"; this represents a 64 x 105 supply and use table.

The difference between the two tables is firstly, the 10 x 10 use table is merely a condensed version of the 64 x 105 use table. Secondly, the 10 x 10 use table includes the informal sector, small-scale electricity, gas and water sector and illegal activities ***as part*** of the electricity, gas and water sector, whereas the 64 x 105 use table shows the informal sector, small-scale electricity, gas and water sector and illegal activities of all the sectors as ***one column*** in the statistical release. The assumption is made that the difference between the two tables by sector represents the informal sector, own accounts sector and illegal activities.

Before determining the estimates of the 2011 calendar year, the 64 x 105 use table needs to be condensed to reflect a 10 x 10 use table as well. This allows the researcher to determine the difference between the two tables, the 10 x 10 and 64 x 105, therefore, to calculate the informal electricity, gas and water sector, small-scale electricity, gas and water sector and illegal electricity, gas and water activities separately for each sector. A problem exists when comparing the two tables, 10 x 10 use table (published 2016) and – after condensing – the 64 x 105 use table (published 2014) to a 10 x 10 use table. It is notable that the two tables differ in IC, value added and output. The reason for this is that the 10 x 10 use table was revised in 2016, although it is not mentioned which sector was revised. To accommodate for this revision of the 10 x 10 use table (2016) intermediate consumption, value added and output, the 64 x 105 use table (2014) is revised and compressed to a 10 x 10 use table. The assumption is made that the revision is added to the informal electricity, gas and water sector, illegal electricity, gas and water sector and own account electricity, gas and water sector.

Firstly, a problem exists when comparing the two tables, 10 x 10 use table (published 2016) and – after condensing – the 64 x 105 use table (published 2014) to a 10 x 10 use table. It is notable that the two tables differ in IC, value added and output. The reason is that the 10 x 10 use table was revised in 2016, although it is not mentioned which sector was revised. To accommodate for this revision of the 10 x 10 use table (2016) IC, value added and output, the 64 x 105 use table (2014) is revised and compressed to a 10 x 10 use table. The assumption is made that the revision is added to

the informal electricity and water sector, illegal electricity and water sector and own account electricity and water sector.

The second step is to determine the difference between the two tables, this represents the informal electricity and water sector, illegal electricity and water sector and own account electricity and water sector, e.g. the difference of revised 10 x 10 supply and use table published P0441 GDP 1st quarter (2016) value added is R86 547 million, whereas the 64 x 105 use table is condensed to a 10 x 10 table value added R86 905 million, equals to a revision of -R358 million. This amount reflects the current estimations for the 2011 informal electricity and water sector, illegal electricity and water sector.

Table 5.17: Electricity and water informal sector and NOE activities for 2011 year (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Translated 64 x 105 translate in 10 x 10 use table (2014)	Electricity and water NOE sector
Intermediate consumption	73 085	72 777	308
Total gross value added	86 547	86 905	-358
Total output at basic prices	159 632	159 682	-50

Source: Statistics South Africa (Release No. P0441, 4th quarter 2014)

It is notable that a decline in the NOE sector is seen in SIC 4 value added. The calculations of SIC 4 (2011), IC reflects R308 million, value added decreased/revised to -R358 million and output decrease with R50 million because of revisions. This current electricity and water informal, small and NOE activities IC, value added and output data is compared under point 6 with the new estimates for 2011.

The following section determines 2016 electricity and water informal, small and NOE activities IC, value added and output. A release by Statistics South Africa is taken into account, Release No. P0441, "*Gross domestic product (GDP) 4th quarter 2017*". Annual, quarterly and regional fourth quarter 2017.xls tables are used, worksheet "SUT 2016"; this represents a 10 x 10 use table and worksheet "use table 2016 (64_105)" that represents the larger use table. The 2016 data is not revised; thus, the two releases are used as is. The 64 x 105 use table is just condensed to a 10 x 10 use table. The two 10 x 10 use tables are subtracted from each other to determine the portion that is allocated to SIC 4 informal sectors, own account sector and NOE activities sector (See table 5.18).

Table 5.18: Electricity and water informal sector, small-scale sector and NOE activities for 2016 year (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Translated 64 x 105 translate in 10 x 10 use table (2014)	Electricity and water NOE sector
Intermediate consumption	111 893	111 893	0
Total gross value added	146 024	146 024	0
Total output at basic prices	257 917	257 911	0

Source: Statistics South Africa (Release No. P0441, 4th quarter 2017)

As indicated in the above table for 2016 this sector does not reflect any informal, NOE activities in SIC 4. This current electricity and water informal, small and NOE activities IC, value added and output data is compared under point 6 with the new estimates of the informal electricity and water sector, small-scale electricity and water sector and the illegal electricity and water activities for 2016.

The following section represents the new calculation of the informal electricity and water sector, small-scale electricity and water sector and the illegal electricity and water activities for the reference years 2011 and 2016.

5.3.3 New calculations of the informal electricity and water sector, electricity and water illegal electricity and water activities (SIC 4)

The discussion of the new estimates on electricity and water sector mainly comprises of informal electricity and illegal electricity activities, informal water/water fetching sector and illegal water activities. The electricity and water sectors are discussed separately, but added together under point 5.4.

5.3.3.1 Electricity sector

This section covers informal and illegal electricity connections. Informal electricity is an activity that is often found in non-formal housing areas. Informal electricity is also an extension of electricity from one household to another[57] as defined by Statistics South Africa (2013:xi), Report 03-18-04, "G*HS Series*", volume V, Energy, 2002-2012. The illegal side of electricity is defined as connections by

[57] (GHS Series, volume V, Energy, 2002-2012, Statistics South Africa (2013:xi), Report 03-18-04)

households to receive electricity from the grid by bypassing the metering system, who are not willing and/or able to pay for electricity[58].

5.3.3.1.1 Informal electricity sector

Measuring the informal electricity sector is based on published data from Statistics South Africa, Department of Mineral and Energy (DME) and related published articles from different authors. Statistics South Africa, Report 03-18-04:94, "General household survey (GHS) Series, volume V. Statistics South Africa," *"In-depth analysis of the General Household Survey data"*, is used to determine the number of households that have no access to electricity and the type of energy that households are using. This release is used together with published data by Statistics South Africa (2017:32), Release No. P0318, "*General Household survey" (GHS)*, this publication provides data for the years from 2002 to 2017 and provides the number of households that have access to electricity.

In order to determine electricity and water output; three steps are involved. Output is determined by multiplying the number of households by the price of electricity by the usage of electricity per day. In determining the output, the first step is to calculate the number of households that do have formal electricity, then the households without electricity, thirdly the number of households with informal connections and lastly the number of households illegally connected (see table 5.19).

In Table 5.19 the first step reflects the calculations used to measure the number of households. The total number of households are obtained from Statistics South Africa midyear estimate population's publication (table 5.19, column 1). The Statistics South Africa (2013:95), *Report no. 03-18-04 version* V is used in measuring the number of informal households that do not have access to electricity. The report concludes that 83,6% (12 815 000 of 15 329 000 households) and 84,4% (14 299 000 of 16 942 000 households) of households did have electricity for the reference years 2011 and 2016 respectively. However, this implies that the remaining households 2 514 000 (2011) and 2 643 000 (2016) are without access to electricity. However, the report further states that 73,1% of these households have an informal electrical connection. This amounted to 1 838 000 (2011) e.g. 2 514 000 multiplied by 73,1%, and 1 932 000 (2016) households did have some kind of informal electricity. Thus, the rest are illegal connections e.g. 2 514 000 households (2011) without electricity subtract the informal equals the illegal households. Illegal connections are discussed under point 5.3.3.1.2.

[58] GHS Series, volume V, Energy, 2002-2012, Statistics South Africa (2013:xi), Report 03-18-04

Table 5.19: Number of households informally and illegally connected for 2011 and 2016 (R' 000)

Year	Number of households in South Africa	Households do have electrification	Households without electricity	Number of households with informal electrification	Number of households with illegal electrification
2011	15 329	12 815	2 514	1 838	676
2016	16 942	14 299	2 643	1 932	711

Source: Statistics South Africa (release No. P0318)

The price of electricity as obtained from the Department of Energy (2016:25) "*South Africa energy price report*"[59] are for 2011, R0.88 per unit and for 2016, R1.23 per unit. The price per kw/h is used to determine informal and illegal electricity usage.

To calculate the usage of electricity for a household, the article of Supporting Sub-Saharan African Municipalities with Sustainable Energy Transitions (SAMSET 2015:23), "*Household energy use in selected areas in and around Cape Town*" is used. The article indicates that the average electricity usage of poor households is between 156 kw/h to 186 kw/h per month. The mean of the kw/h is used to measure the output of informal electricity per household, thus 171kw/h. The yearly usage of electricity is 171kw/h multiplied by 12, thus 2 052 kw/h.

The 2011 informal sector output is calculated by the number of households, 1 838 000 million, multiplied by the price of a kw/h, R0.88, multiplied by the mean usage per annum, 2 052 kw/h. The informal electricity usage for 2011 amounted to R3 318 million. The 2016 informal sector output is calculated by the number of households, 1 932 million, multiplied by the price of a kw/h, R1.23, multiplied by the mean usage per annum, 2 052 kw/h. The informal electricity usage for 2011 amounted to R4 876 million.

Determining the IC is more of a challenge, as the input cost in rand value is not available. To overcome this obstacle the IC is determined by using the ratio of IC to output, from Table 5.17. For 2011 and 2016, the ratio of IC to output is 34,7 percent and 34,8 percent respectively. If the ratio is considered, the amount for IC in 2011 amounted to R1 151 million and R1 696 million in 2016 year. Value added is calculated by output minus IC. Value added of the informal sector is reflected in Table 5.20 for the reference years 2011 and 2016.

[59] http://www.energy.gov.za/files/media/explained/Energy-Price-Report-2016.pdf

Table 5.20: Measuring informal electricity usage for 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011	3 318	1 151	2 167
2016	4 876	1 696	3 180

Table 5.20 indicates that value added for the informal sector of electricity amounted to R 2 156 million (2011) and R3 180 million (2016). This includes all alternative usage of electricity such as wood, paraffin, and dung etc., meaning no formal connection to electricity from ESKOM or any municipality. An argument can be made that this informal sector usage figure is too high but an article by Shackleton et.al (2011:62), "*Non-Timber forest products in global context*", indicate that fuel wood had an approximate value of R3 000 million annually (2011) in South Africa. If this argument of Shackleton is taken into account, the amount in Table 5.19 value added is underestimated as the Shackleton article only reflects wood for energy. The further discussion calculates the illegal usage of electricity and water.

5.3.3.1.2 Illicit electricity usage

As the aforementioned definition reflects, illegal electrical usage is the receiving of electricity without paying for electricity. The methodology of illegal electricity is based on the same publications than used for the informal electricity sector. Statistics South Africa , Report 03-18-04:94, "General household survey" (GHS) Series, volume V. Statistics South Africa," *In-depth analysis of the General Household Survey data*", is used to determine the number of households that have no access to electricity and the type of energy the households are using. This release is used together with published data by Statistics South Africa (2017:32), Release No. P0318, "*General Household survey (GHS)*", as it indicates the years from 2002 to 2017 and number of households that have access to electricity.

To determine the impact that illegal electricity has on the economy the output, IC and value added needs to be measured. Output is determined by the number of households using electricity illegally multiplied by the price of electricity multiplied by the usage of electricity. IC is the cost to obtain electricity, whereas value added equals output minus IC.

To determine the output of the illegal electricity sector, the same steps are used as the informal sector as discussed in paragraph 5.3.3.1.1, the only difference is the number of households. In this discussion the number of households using illegal electricity, according Table 5.19, is used.

The 2011 the number of households that received electricity illegally amounted to 676 000 households and for the 2016 year, 711 000 households. The price of electricity remains the same as the informal sector namely R0.88 kw/h per unit (2011) and R1.23 kw/h per unit (2016). The usage annually is 2052 kw/h. The output for 2011 is the number of households (676 000) multiplied by the price per kw/h (R0.88) multiplied by 2 052 kw/h per annum. This amounts to R1 221 million use of illegal electricity. The output for 2016 is the number of households (711 000) multiplied by the price per kw/h (R1,23) multiplied by 2052 per annum. This amounts to R1 794 million use of illegal electricity.

The intermediate consumption for both years, 2011 and 2016, is seen as zero because the service provider carried the cost. Value added is determined by output minus IC.

Table 5.21: Measuring illegal electricity usage for 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011	1 221	0	1 221
2016	1 794	0	1 794

Table 5.21 reflects that the value added is R1 221 million (2011) and R1 794 million (2016). The IC is reflected as zero for both years. This argument can be made that it does not reflect the true value, but the counter argument is that the output is underestimated because not all residents declare that they use electricity illegally. The survey reflected by Statistics South Africa is a sample survey and is based on the responses of the residents. Residents admitted that they access electricity illegally because they do not want to pay more, and/or consider the price of electricity as too high.

A further argument supporting this statement is from an article which states that South Africa, Eskom and municipalities lost an estimated R7.5 billion yearly due to electricity theft.[60] Business tech (2014), "*How much electricity is stolen in South Africa*", states that Eskom has revealed that as much as 7% of the country's electricity is stolen via illegal connections, something the state power utility can no

[60] https://citizen.co.za/news/south-africa/1090038/electricity-theft-costs-eskom-r7-5bn-annually/

longer afford.[61] The Lowvelder newspaper, (2016) "*Illegal electricity connections affect you*", supports these findings reflected in Table 5.21 as it indicates that illegally accessed electricity costs South Africa approximately R20 billion per annum[62]. This reflects that the total amount of value add can be underestimated.

Part of this sector as reflected in the introduction is water and sanitation (SIC 413) as classified by the international guideline Standard industrial classification. This is discussed under point 5.4.

5.3.4 Water sector

The water supply sector, except for formal supply, also includes informal and illegal water supply. Collecting water from rivers or dams to provide for drinking and washing forms part of the informal sector and is discussed as water fetching. Illegal water usage is defined as a citizen that receives water without paying for it, it could be by bypassing the water meter or illegal connections to a formal water system.

The methodology on how to determine the informal and illegal water connections are not mentioned in The OECD (2002) guideline document. In this discussion, the informal water sector and NOE water activities are discussed together. The main reason for this is that, according to published data by Statistics South Africa (2016:36), Release No. P0318, "*General Household survey (GHS)"*, the data is reflected as the total households who do not pay for water. To avoid double counting as indicated in the international guidelines (OECD:157), the illegal sector and informal sector are added together.

5.3.4.1 Informal and illegal usage of water

Households with no access to water can have informal water connections such as water carriers, neighbour's taps, public communal taps, well springs and stagnant water/dam and pool water. According to the 2008 SNA, production within the boundaries of SA includes own account production; therefore, included in GDP. Statistics South Africa (2016:39), Release No. P0318, "*General Household survey (GHS)"*, is used to base this analysis on. According to Statistics South Africa, 6 266 000 (2011) and 8 152 000 (2016) households have no access to water. The assumption is that those that do not

[61] https://businesstech.co.za/news/general/75246/how-much-electricity-is-stolen-in-south-africa/
[62] https://lowvelder.co.za/358010/illegal-electricity-connections-affect-you/

have access to formal water, need to find some way of getting water, even if it is for drinking or cooking; this is seen as informal water fetching or illegal connection.

To calculate the water sector output of the informal water sector and NOE water activity consumption, the formula in use is the total number of households who receive informal and illegal water multiplied by the cost of water multiplied by the number of litres in use for a household per annum. The number of households are obtained from Statistics South Africa (2016:39), Release No. P0318, "*General Household survey (GHS)*", to base this analysis on. According to this publication by Statistics South Africa, 6266 (2011) and 8152 (2016) of households have no access to water.

The price (cost) of water is determined by a sliding scale - the more you use, the more you pay. In this discussion the tariff used is just above 6 kl as the free basic services (FBS) is taken into account. The price of water is provided annually by the Department of Water and Sanitation in the publication, "*A national assessment of water services tariffs from source to tap and return flows to source"*. The average price of water paid by the consumer is R9,38 (2016) and R8,90 (2011). This is also supported by an article by Hoffman J.J & du Plessis J.A (2013), "*A model to assess water tariffs as part of water demand management*".

The number of kilolitre usage per year are based on two research documents. According to an article by Kanyoka P et.al (2008:4), "*Households' preferences and willingness to pay for multiple use water services in rural areas of South Africa: an analysis based on choice modelling*", households use between 75 litres to 200 litres of water per day. Another study by Hay E.R. (2012), "*Ensuring water supply for all towns and villages in the Eastern Cape and Western Cape Provinces of South Africa*", determines water usage between 60kl to 250kl per month; thus the mean is 155kl per day of these two articles. In this discussion, the mean usage between the two studies, 146,25 litres per day, is used. The annual consumption amounted to 146,25 litres multiplied by 365 days, which equals to 53381 litres, translated into kilolitres it is 53,4kl per poor household per annum. These two studies reflect water usage after free basic water (FBS) is excluded.

In determining the output of water for 2011, the number of households (6266) are multiplied by the price (R8,90) multiplied by the annual usage (53,4kl), which equals to R2 978 million. The same formula is used for 2016: the number of households (8 152) are multiplied by the price (R9,38) multiplied by the annual usage (53,4kl), which equals to R4 083 million.

Table 5.22: Measuring the output of informal water usage (R' million)

Year	Number of households without water	Price of water	Usage of water per annum	Output of water
2011	6 266	8,90	53,40	2 978
2016	8 152	9,38	53,40	4 083

As indicated in Table 5.22, only the output is reflected. Measuring the total value added is output minus intermediate consumption (IC). The assumption is made that IC is zero as water is a natural resource and obtained from nature. Citizens do not need to pay for it and when it is illegally obtained, the cost is carried by the service provider, which normally is the municipality.

Table 5.23: Measuring the value added for the informal water usage (R' million)

Year	Output	Intermediate consumption	Value added
2011	2 978	0	2 978
2016	4 083	0	4 083

The argument can exist that IC needs to be calculated as a percentage of output as in illegal electricity, but a counter argument exists. In this case, according to a study by Smith J.A. (2010), *"How much water is enough?"* when tampering with a meter, as with illegal consumption, the households that tamper with their meters use approximately 14.4 kℓ per month. When taking this into account, the total number of value added is underestimated as the illegal and informal water usage is measured the same, namely 53 kl per annum. Taking the study of Smith (2010) into consideration, the annual usage of water is 172,8 kl per annum only for illegal usage. If the same number of households are used at the same price, the value added in Table 5.23 for the 2011 year value added is R9 636 million and the 2016 year value added is R13 213 million, thus Table 5.27 is totally underestimated.

5.3.5 New estimation of informal and illegal electricity and water sector (SIC 4)

The total informal and illegal electricity and water sectors for the reference years 2011 and 2016 are shown in Table 5.24. Measuring the total informal and illegal activities of the electricity sector and water sector for the applicable years, allows the researcher to determine the size of the SIC 4 sector and to answer the research question if the electricity and water sectors were under-/overestimated.

Table 5.24: Total informal sector and illegal activities for SIC 4 reference period 2011 and 2016

Year	Output	Intermediate consumption	Value added
2011	7 517	1 151	6 366
2016	10 753	1 696	9 057

When calculations in Table 5.24 is taken into account the likelihood still remains that the value added is underestimated. The reason for this is that data is based on published data and it is not taken into account that people use grey water and water obtained from boreholes. These activities are mostly a luxury and is done in urban areas. The household survey covers a sample of households in rural areas.

The data in Table 5.24 for the respective years is compared with the published data to determine the over-/underestimation of SIC 4. The evaluation of data against the published data also includes the formal sector as it is necessary to evaluate the entire SIC 4 sector.

5.3.6 Evaluation of published data against newly calculated estimates for 2011 and 2016 of the electricity sector and water sector (SIC 4)

To determine the over-/underestimation for the reference years 2011 and 2016, the new estimates are analysed against the current published data for each year. Table 5.25 reflects the over-/ underestimation of the electricity and water sector (SIC 4) for 2011. The published data is obtained from Table 5.17 (2011), column 3.

Table 5.25: Measuring the current finding against the published GDP data for 2011 (R' million)

	Total published formal, informal, NOE of SIC 4	New estimation of formal, informal, NOE SIC 4 sector	Over-/underestimation of the electricity and water sector (SIC 4)
Intermediate consumption	308	2 302	-1 994
Total gross value added	-358	12 732	-13 090
Total output at basic prices	-50	15 034	-15 084

It is clear that for 2011 the IC, value added and output are underestimated. The new estimations show a clear gap against the current estimations. Furthermore, it is unlikely that the current estimate really reflects the true value. The reason for the negative value added could be caused by the revision, but still the value added for electricity illegal activities and informal sector is too low, especially if one takes the current poverty and high unemployment rate into consideration, where people endeavour

to obtain water and electricity illegally. The next table reflects the 2016 current published data against the new estimates.

Table 5.26: Total informal sector and illegal activities of SIC 4 reference period 2016 (R' million)

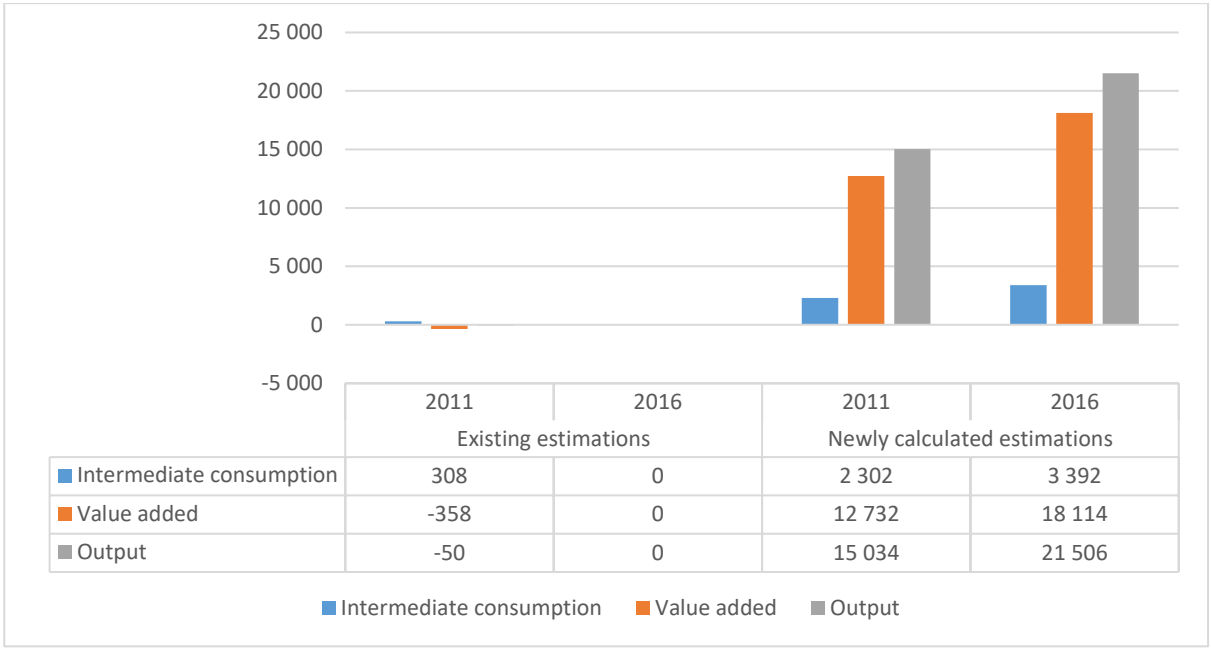
	Total published formal, informal, NOE of SIC 4	Current estimation of formal, informal, NOE SIC 4	Over-/under-estimation of the electricity and water sector (SIC 4)
Intermediate consumption	0	3 392	-3 392
Total gross value added	0	18 114	-18 114
Total output at basic prices	0	21 506	-21 506

The 2016 calendar year indicates that no informal sector and illegal activities were reflected in the publication for 2016. This can relate to the assumption made to subtract the two releases. The second reason for non-reflection of data is because Statistics South Africa data on the informal and illegal activities methodology is not clear. This problem can be overcome if Statistics South Africa made available the informal electricity and water sector and illegal electricity and water sector as a separate column under SIC 4. In 2016 it reflects that IC, value added and output is underestimated.

5.3.7 Gap between existing published calculations and newly estimations of the electricity and water sector

This section illustrates by means of a graph the differences between current published data and the new estimations for 2011 and 2016. Secondly, it explains the reasons why data differs and limitations exist. Lastly, some recommendations on how to close the gap between the new calculations and published data annually are made.

Graph 5.2: The gap between the newly NOE sector of SIC 4 compare to the current estimates of the NOE sector for the calendar year 2011 and 2016



	2011	2016	2011	2016
	Existing estimations		Newly calculated estimations	
Intermediate consumption	308	0	2 302	3 392
Value added	-358	0	12 732	18 114
Output	-50	0	15 034	21 506

Graph 5.2 illustrates the gap between the current data and newly calculated informal electricity and water sector and illegal electricity and water activities. Some reasons which caused the gap between the current estimations and the new estimates are firstly, not all characteristics of the 2008 SNA were considered when data was published by Statistics South Africa in the GDP release (P0441), this is also verified by Statistics South Africa Report No. 04-04-03 (2010), where it is mentioned that the 2008 SNA was "partially implemented".

Secondly, the new calculations include the newest international guidelines in this discussion, i.e. how to determine the informal sector as a NOE activity according to the 2008 SNA, Eurostat (2018) and OECD (2002) guidelines. It is not clearly indicated which international guidelines are implemented in the current estimations, the only guideline that is mentioned is the 2008 SNA.

To avoid confusion on the methodology in use, it is explained how to measure the informal sector and NOE activities of SIC 4 in the new calculations whereas the methodology is not clearly explained in the current estimates by Statistics South Africa, Release No. P0441, "*Gross domestic product (GDP)*". The researcher also explains the definitions and characteristics that is used to determine the new estimates, although this is unknown from Statistics South Africa.

A further reason is that Statistics South Africa in 2016 did not indicate any informal and NOE activities. This could be a misunderstanding, but can be avoided if Statistics South Africa showed all informal

and NOE activities separately, under each sector and not as one column such as in the 64 x 105 use table. Another reason for the gap could be contributed to the sharp increase in illegal electricity connections that is not reflected in the published data. This is also mentioned in an article written by Slabbert (2015), *"Electricity theft out of control in Tshwane"*[63] where the author indicates that electricity meter tampering and faulty meters cost the metro R416 million for the financial year 2013/14 and reflects an increase of 83% from the previous financial year. Furthermore, it is acknowledged by the researcher that data limitations do exist regarding the exact usage of illegal electricity as this data is unknown by distributors (municipal authorities) and the electricity generator (ESKOM).

To lessen the gap between current, published data and newly estimates the methodology can be revised as soon as new published crime statistics become available from the SAPS, municipalities and ESKOM for illegal connections. Secondly, an explanation on the methodology that Statistics South Africa use to measure the informal and illegal SIC 4 sectors can lead to more transparency and revisions of the newly estimates. Lastly, it can be helpful if Statistics South Africa provided the informal and NOE activities of SIC 4 sector separately and not as one column as shown in Release No. P0441, "*Gross domestic product (GDP)*"; this makes comparison and analysis clearer and the gap can be resolved.

5.3.8 Concluding remarks with regard to the non-observed electricity sector, gas sector and water sector

Notwithstanding all the limitations in the data and assumptions made, the research question about the size of the informal sector and illegal activities for SIC 4 (the electricity and water sector) has been addressed. And the finding is that for the periods 2011 and 2016 value added, IC and output were underestimated; this indicates that the electricity gas and water sector is underestimated. The underestimation in this sector results in an underestimation of the value added of the total economy and GDP of South Africa. The final result where all the sectors are added together and evaluated against the P0441, will determine the exact size of underestimation. The advantage is that this methodology to calculate the size of informal and illegal electricity and water sector is usable for national accounts.

[63] https://mybroadband.co.za/news/government/117892-electricity-theft-out-of-control-in-tshwane.html

5.4 OVER OR UNDERESTIMATION OF THE CONSTRUCTION SECTOR (SIC 5)

5.4.1 Introduction

The last section under discussion of the secondary sector is the construction sector. The construction sector is the economic activities involved in building of new buildings, building alterations and preparing of land to build on.

In terms of the research problem formulated for the purpose of this study and the conceptual framework shown above, the question to answer if the construction sector's total size is accounted for in the GDP given that the NOE component of the construction sector might be underestimated. Is this sector over- or underestimated- taking all the parameters into consideration such as formal activities, informal activities and illegal sector. In 2011, the construction sector value added represented 3,3 percent of the total economy data, whereas in 2016, it represented 3,6 percent of the total economy (Statistics South Africa, Release No P0441). As mentioned in the objectives, the sub sectors are not calculated but is only determined at one-digit level, thus the entire construction sector is added together. To measure the size of this sectors 'over-/underestimation the informal sector and own account construction are taken into account, illegal construction is not calculated as it seen as part of informal construction.

5.4.2 Current estimation of the size of the Construction Sector

In order to determine the current size of the construction sector, the Standard Industrial Classification (SIC) is being used. According to the SIC, the construction sector comprises of construction, site preparation, buildings complete or parts thereof and building installations. In order to measure the size of the construction sector, the following formula is taken into account:

SIC 5 = Construction sector (Formal construction sector + small-scale construction sector/informal construction sector + illegal construction activities)

Taking the size of the construction sector formula into consideration, the existing estimates for the construction sector are obtained from two statistical releases. Firstly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP) 1st quarter 2016*", the table in use is GDP annual and regional Table 2016, worksheet "SUT 2011"; this represents a 10 x 10 supply and use table. Secondly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP)" 4th quarter 2014*", the table

in use is Tables 4th quarter 2014.xls, worksheet "Use table 2011"; this represents a 64 x 105 supply and use table.

The difference between the two tables is firstly, that the 10 x 10 use table is only a condensed version of the 64 x 105 use table. Secondly, the 10 x 10 use table includes the informal sector, small-scale construction sector and illegal activities ***as part*** of the construction sector, whereas the 64 x 105 use table shows the informal sector, small-scale construction sector and illegal activities of all the sectors as ***one column*** in the statistical release. The assumption is made that the difference between the two tables by sector represent the informal sector, own account sector and illegal activities.

Before determining the estimates of the 2011 calendar year, the 64 x 105 use table needs to be condensed to reflect a 10 x 10 use table as well. This allows the researcher to subtract the two tables, the 101 x 10 and 64_105, from each other to calculate the SIC 5 informal sector, small-scale sector and NOE activities separate for each sector. The reason for subtracting the two table from each other is that the 10 x 10 SUT shows all sectors included the informal, small-scale and NOE activities as part of the sector, whereas in the 64 X 105 informal, small-scale and NOE activities is shown separately; thus, by subtracting the two tables the informal sector, small-scale sector and NOE activities is determine by sector separately. This allows the researcher to measure if the informal sector, small-scale sector and NOE activities is under-/overestimated. Determining the 2011 SIC 5 informal sector, small-scale sector and NOE activities involves a couple of steps.

Firstly, a problem exists when comparing the two tables, 10 x 10 use table (published 2016) and after condensing the 64 x 105 use table (published 2014) to a 10 x 10 use table, it is notable that the two tables differ in IC, value added and output. The reason is that the 10 x 10 use table was revised in 2016, although it is not mentioned which sector was revised. To accommodate for this revision of the 10 x 10 use table (2016) IC, value added and output, the 64 x 105 use table (2014) is revised and compressed to a 10 x 10 use table. The assumption is made that the revision is added to the informal construction sector, illegal construction sector and own account construction sector.

The second step is to determine the difference between the two tables, this represents the informal construction sector, illegal construction sector and own account construction sector e.g. the difference of revised 10 x 10 supply and use table published P0441 GDP 1st quarter (2016) value added are R103 835 million whereas the 64 x 105 use table are condescend to a 10 x 10 table value added R86 029 million, this equals to the R17 806 million. This amount reflects the current

estimations for 2011 informal construction sector, illegal construction sector and own account construction sector.

Table 5.27: Informal construction sector, illegal construction sector and own account construction sector for 2011 year (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Supply and use table 64 x 105 published P0441 GDP 4th quarter 2014	Difference between two tables reflects the revision portion of NOE sector allocated to construction sector
Intermediate consumption	240 484	213 229	27 255
Total gross value added	103 835	86 029	17 806
Total output at basic prices	344 319	299 259	45 061

Source: Statistics South Africa (release No. P0441, 4th quarter 2014)

Table 5.27 measures the IC, value added and output after revisions in 2016 affected the 10 x 10 use table. This is seen as the published informal, small and illegal sector allocated to construction sector. This is evaluated under point 5 against the newly estimates of the informal, small and NOE activities allocated to construction sector; this represent the over-/underestimation of the 2011 year's value added.

The following section determines 2016 informal construction, small construction and NOE construction activities of IC, value added and output. A release by Statistics South Africa is taken into account, Release No. P0441, "*Gross domestic product (GDP) 4th quarter 2017*". Annual, quarterly and regional fourth quarter 2017.xls tables are used, worksheet "SUT 2016"; this represents a 10 x 10 use table and worksheet "use table 2016 (64_105)" that represents the larger use table. The 2016 data is not revised; therefore, the two releases are used as is. The 64 x 105 use table is just condensed to a 10 x 10 use table. Determining the difference between the two 10 x 10 use tables, it represents the portion that is allocated to the SIC 5 informal sectors, own account sector and NOE activities sector, see table below.

Table 5.28: Construction informal sector, small-scale sector and NOE activities for 2016 year (R' million)

	Use table 10 x 10 published P0441 GDP 1st quarter 2016	Supply and use table 64 x 105 condensed to 10 x 10 use table	Difference between two tables reflects the construction NOE sector
Intermediate consumption	344 786	302 038	42 748
Total gross value added	154 368	127 987	26 381
Total output at basic prices	499 155	430 025	69 129

Source: Statistics South Africa (release No. P0441, 4th quarter 2017)

Table 5.28 represents the 2016 data that is allocated to the informal construction sector, small-scale construction sector and illegal construction activities. This current construction informal, small and NOE activities IC, value added and output data is compared under point 5 with the new estimates of the informal construction sector, small-scale construction sector and the illegal construction activities for 2016.

The following section represents the new calculation of the informal construction sector, small-scale construction sector and the illegal construction activities for the reference years 2011 and 2016.

5.4.3 New calculations of the construction sector informal and illegal activities (SIC 5)

This section consists of the informal and own account construction. Limited data exists on illegal construction; thus it is seen as part of informal construction e.g. the building of shacks is unknown whether it is established illegally or legally. The question in the household survey is only determine the kind of housing. To avoid double counting, as warned by the international guidelines (OECD 2002), these activities are estimated as one.

5.4.3.1 Informal construction sector

Informal settlements are unplanned settlements in areas where dwellings are not complying with building regulations of local authorities. According to household surveys published by Statistics South Africa, informal construction includes a room in the backyard, a shack in the backyard, a caravan, and servants' quarters. Furthermore, the OECD (2002:183) defines informal construction as extensions that are made to buildings and should be reported as part of the economy activity within the boundaries of a country. The OECD includes illegal settlements as part of informal settlements. The OECD (2002) defines informal settlements as areas where groups of dwelling units are built on land that the occupants occupy illegally, or owners have no legal claims on ground but still erect a dwelling.

The informal sector is measured by taking existing building statistics into consideration; therefore, the methodology is more analytical in nature. To determine the informal sector, the publications of Statistics South Africa, Release No. P0318, "General household survey (GHS)" and Statistics South Africa (2016), report No: 03-18-06, "GHS Series VII, Housing from a human settlement perspective, In-depth analysis of the General Household Survey data 2002 – 2014", were used.

In determining the output for 2011 and 2016 informal construction, the number of households were multiplied by the average price. According to the OECD (2002:183), the output of housing should be determined by the replacement cost, and it does not mention how to measure the IC. In order to calculate the IC, an assumption is made to use the current formal construction ratio of IC towards output. The reason for this is that building material cost is the same for formal houses as informal houses.

Statistics South Africa (2011:108), Release No. P0318,"GHS" is used in measuring the number of informal dwellings in 2011. The report concludes that informal dwellings are 2 858 000. The type of dwellings that are added together are: "dwelling/house/flat/room in backyard" (476 000), "informal dwelling house/shack in backyard" (872 000) "informal dwelling/shack not in backyard" (1 102 000), "room/flat on property servant quarters" (404 000) and "caravan and tents" (4 000), thus total informal dwellings are 2 858 ('000). The price of dwellings is more difficult to measure according to Statistics South Africa, *report No. 03-18-06*, GHS Series VII, Housing from a human settlement perspective. In-depth analysis of the General Household Survey data 2002 – 2014, determined that 94,8% of informal dwellings are less than R50 000. The assumption the researcher makes is that all informal dwellings cost less than R50 000. According to News24[64] (2011), the cost to build an RDP house is around R54 000, but the selling price of an RDP house is approximately R15 000 to R20 000. The median price of these three prices is taken into account, thus R29 000. To determine 2011 output equals 2 858 000 (number of dwellings) multiplied by the price (R29 000) divided by R' million, which equals to R82 882 million. Intermediate cost is the cost to build the dwelling. The ratio between formal IC to formal output is taken into account. Formal construction works IC is (R215 430 million) and output is R297 430 million, thus it is 72%. Value added is output minus IC.

Statistics South Africa (2011:108), release No. P0318,"GHS" is used in measuring the number of informal dwellings in 2016. The report concludes that informal dwellings are 3746 000. The type of

[64] https://www.news24.com/SouthAfrica/News/RDP-houses-to-bona-fide-citizens-20111019

dwellings that are added together are: “dwelling/house/flat/room in backyard” (663 000), “informal dwelling house/shack in backyard” (873 000), “informal dwelling/shack not in backyard” (1 439 000), “room/flat on property servant quarters” (760 000) and “caravan and tents” (11 000), thus total informal dwellings are 2 858 000. The cost to replace an informal dwelling for reference year 2016 is unknown. The researcher uses a y/y growth rate of 6,1% based on the 2011-year to determine the 2016-year’s replacement cost of the informal dwelling, this amounted to R38 991. The output is 3 746 000 (number of dwellings) multiplied by the price (R38 991), divided with R million, which equals to R146 060 million. Intermediate cost is the cost to build the dwelling. The ratio between formal IC to formal output is taken into account. Formal construction works IC is (R344 786 million) and output is R499 155 million, thus it is 69%. Value added is Output minus IC.

Measuring the informal construction and illegal construction for 2011 and 2016 calendar year is reflected in Table 5.33.

Table 5.29: Informal construction sector for 2011 and 2016 (R’ million)

	2011	2016
Intermediate consumption	59 675	100 782
Value added	23 207	45 279
Total output at basic prices	82 882	146 060

Source: Statistics South Africa (release No. P0318)

Analyses of the above table indicate that informal construction value added almost doubled between 2011 and 2016. The main reason for this is the increase in informal and illegal settlements due to the rise in poverty, immigration and high unemployment.

An argument can exist that value added could be overestimated because of low IC, it should be noted that the same cost of material in the formal sector is used although informal settlements’ building material can be lower. The value added is further evaluated under point 5 where it is evaluated against the published data.

5.4.3.2 Own-account construction sector

Own-account construction is defined as construction which an owner does himself and is not passed through the formal building plan process; thus, it is not accounted for as formal registered building

construction. Own-account construction can be fences, extension to a house done by the owner him/herself, improvements to a building done by the owner, etc.

Statistics South Africa (2014), Release No. P0276, "*Survey of Employers and the Self-employed 2013*", is used in measuring the own account workers. The tables that provide details on the own account workers and kind of activity involved are obtained from Statistics South Africa directly. According to this release, Table 18, the last calendar month owner had a net profit of R1 015 million (2013). The last calendar month mean the month prior to when the survey was conducted. To determine the annual profit, the monthly profit is multiplied by 12.

The disadvantage of this publication is that it is a fourth-yearly publication - the publication is for 2009 and then the next publication 2013. In determining the 2011 calendar year, the average growth rate of the construction data is used namely 6,1 percent based on the 2009 statistical release. Determining the 2016 calendar year, the average growth rate of the construction data is used namely 6,1 percent based on the 2013 statistical release. The assumption is made that the net profit includes all expenditure. The output for 2011 is measured at R10 771 million and R14 518 million (2016).

Table 5.30: Measuring value added of own-account construction activities for 2011 and 2016 (R' million)

	2011	2016
Intermediate consumption	0[65]	0[66]
Value added	10 771	14 518
Total output at basic prices	10 771	14 518

Source: Statistics South Africa (release No. P0276)

In Table 5.30 own account construction shows a smaller increase in value added of the informal sector as reflected in Table 5.29, this can be ascribed to the higher cost of living for the middle class. The assumption is made that extensions by owners themselves decrease as the cost of living increases. To determine the total informal construction sector, illegal construction sector and own account the tables are added together, and results are reflected under point 5.4.4.

[65] Uses net profit data of SESE publication, thus no intermediate consumption considered
[66] Uses net profit data of SESE publication, thus no intermediate consumption considered

5.4.4 New estimation of informal, illegal construction and own account construction sector (SIC 5)

This section reflects two datasets – one for the reference period 2011 and the other for the reference period 2016. Table 5.31 indicates the value of total output, intermediate consumption and the value added separately, and includes the total sector (SIC 5) illegal activities and informal sector.

Table 5.31: Total informal sector, illegal activities and own account construction sector for SIC 5 reference period 2011 and 2016 (R' million)

	2011	2016
Intermediate consumption	59 675	100 782
Value added	23 207	45 279
Total output at basic prices	82 882	146 060

When all of the above values are taken into consideration, the likelihood still exists that the value added of this sector is underestimated. The main reason is that some illegal activities such as land grabbing is not reflected, and the reselling of RDP houses is not taken into account.

5.5 Evaluation of published data against newly calculated estimates for the construction sector

The evaluation against the published data determines if the informal sector and non-observed economy are over-/underestimated. The two reference periods, namely 2011 and 2016, are shown separately.

To determine the over-/underestimation of the informal sector and NOE activities, as outlined in the objective statement, the newly calculated informal sector and NOE activities data for the specific reference year are evaluated against the existing published data. The existing data published by Statistics South Africa, Release No. P0441 is obtained from the first table in this section, column 3.

Table 5.32: Total informal sector and illegal activities value added for the reference period 2011 (R' million)

	Total published formal, informal, NOE of SIC 5	New estimation of formal, informal, NOE SIC 5 sector	Over-/underestimation of the construction sector (SIC 5)
Intermediate consumption	27 255	59 675	-32 420
Total gross value added	17 806	23 207	-16 172
Total output at basic prices	45 061	82 882	-48 592

From the above table, it is clear that the value added for the period 2011 is underestimated by R16 172 million. The underestimation of the value added has an impact on the total economy GDP of a country, this result is further explained in chapter 7.

To determine the over-/underestimation of the informal sector and NOE activities for the calendar year 2016, the existing data by Statistics South Africa Release No. P0441 in the second table of this section, column 3, is evaluated against the newly estimated construction sector informal sector, small-scale sector and illegal activities (Table 5.33).

Table 5.33: Total informal sector and illegal activities value added for the construction sector reference period 2016 (R' million)

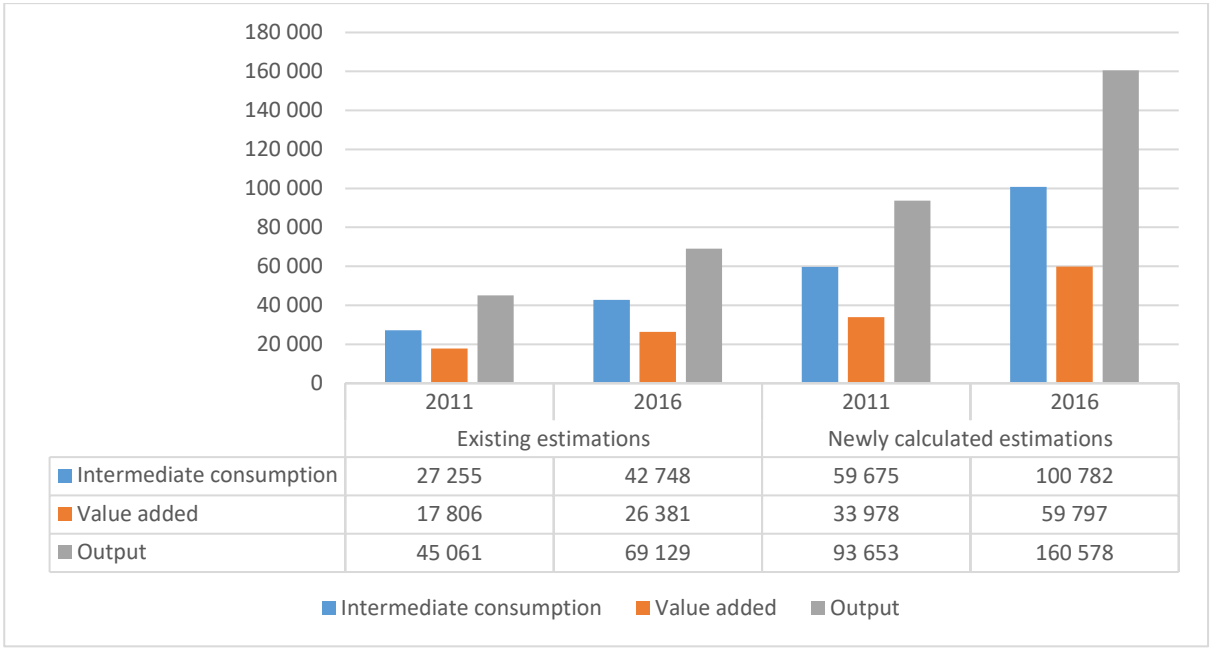
	Total published formal, informal, NOE activities	Current estimation of formal, informal, NOE activities	Over-/under-estimation of the construction sector (SIC 5)
Intermediate consumption	42 748	100 782	-58 034
Total gross value added	26 381	59 797	-33 416
Total output at basic prices	69 129	160 578	-91 449

From the above table, it is clear that the value added for the period 2016 is underestimated by R33 416 million for SIC 5 value added; thus, it results in an underestimation of the total GDP. The results of both years indicate an underestimation of intermediate consumption, value added and output. These results are better conveyed as it is illustrated in a graph. The following section explains the reasons for the gap and the limitations.

5.6 Gap between existing published calculations and newly estimations of the construction sector

This section illustrates by means of a graph the differences of current published data against the newly estimations for 2011 and 2016. Secondly, it explains the reasons why data differs and limitations exist. Lastly, some recommendations are made on how to close the gap between new calculations and published data on an annual basis.

Graph 5.3: The gap between the newly NOE sector of SIC 5 compared to the current estimates of the NOE sector for the calendar year 2011 and 2016



Graph 5.3 illustrates the gap between the current estimates and newly calculated informal construction sector, own account construction sector and NOE construction sector estimates. Some of the reasons which caused the gap between the current estimations and the mew estimates are firstly, not all characteristics of the 2008 SNA were taken into account when data was published by Statistics South Africa in the GDP release (P0441). This is also verified by Statistics South Africa Report No. 04-04-03 (2010), where it is mentioned that the 2008 SNA was "partially implemented".

Secondly, the new calculations include the latest international guidelines on how to determine the informal sector NOE activities - such as the Eurostat (2018) and OECD (2002) guidelines. It is not clearly indicated which international guidelines are implemented in the current estimations by Statistics South Africa.

To avoid confusion on the methodology in use, it is explained how to measure the informal sector, own account sector and NOE activities of SIC 5 in the new calculations whereas the methodology is not clearly explained in the current estimates by Statistics South Africa, Release No. P0441, “Gross domestic product (GDP)”.

Thirdly, with the newly calculated estimates, the latest published household data is implemented whereas it is not clearly explained if the household survey data – Statistics South Africa (2016) and

(2011) release No. P0318, "*General Household Survey (GHS)*" – were implemented and data were revised annually with the latest published GDP data by Statistics South Africa.

Furthermore, it is acknowledged by the researcher that some data limitations still exist with regard to data availability on illegal activities from the SAPS. Step by step guidelines of the OECD (2002) handbook on how to measure illegal and informal activities specific to the construction sector were not stipulated, thus the assumption was that calculations are country-specific. The likelihood exists that illegal construction is underestimated, as it excludes shacks that are illegal built on not owned ground, illegal extension that is not registered at authorities, start of building without approved plans etc.

To close the gap between existing publish GDP data and newly estimations the methodology can be revised as soon as the next national census data becomes available to ensure that the number of dwellings are corrected. The type of dwelling also plays an important role to ensure that the correct price is assigned - it must be clear if it is a one-bedroom, two-bedroom etc. because replacement cost differs. It will be useful if Statistics South Africa could explain each sector's methodology in use when determining the informal sector, own account sector and NOE activities. Furthermore, Statistics South Africa could provide the informal construction sector, own account construction and illegal construction by sector, which would avoid assumptions.

5.7 Concluding remarks with regard to the construction sector

It is notable in the above discussion that the illegal economic activities are totally underestimated. The reason for underestimation of the illegal economic activities is because none - or very little - information is available with regard to the illegal erection of shacks, illegal construction of houses in backyards and construction that takes place irrespective of a delay in building plans approval. If these activities are taken into account, it will make a significant effect on the size of the construction sector.

Notwithstanding all the limitations in the data and assumptions made, the objective of the research on the construction sector was met. The size of the construction sector informal sector, own account sector and illegal activities are underestimated for both 2011 and 2016 in respect of IC, value added and output. The second objective as stipulated in Chapter one was to follow the international guidelines. The new estimates follow the international guidelines such as 2008 SNA, OECD (2002), and Eurostat (2018) guidelines. A further objective was that national accountants could use the

methodology to have more accurate calculations of the GDP: the methodology of the new estimates is clearly explained. The final conclusion is that the size of the construction sector was underestimated by value added into account and this underestimated the GDP.

5.8 Concluding remarks

The total secondary sector is underestimated and the final results are explained in chapter 7. The next chapter reflects the possible over-/underestimation of the tertiary sector.

CHAPTER 6: DETERMINING THE OVER- OR UNDERESTIMATION OF THE TERTIARY SECTOR

6.1 Introduction

In a developing country the primary and secondary sectors are the most important, but as a country develops, the tertiary sector plays an increasingly important role. The tertiary sector is the sector of the economy which provides a service to its clients (i.e. individuals, businesses and government). The tertiary sector includes industries such as wholesale- and retail trade, and restaurants (SIC 6), secondly transport, storage and communication (SIC 7) thirdly financial sector (SIC 8) and the public administration which includes education, health and other sectors (SIC 9) and those not elsewhere classified (SIC 01).

This sector's focus on the wholesale sector, trade sector, restaurants sector and accommodation sector. The first industry under discussion is wholesale, retail trade sector, restaurants and accommodation (SIC 6). This is classified according to the SIC.

6.2 WHOLESALE TRADE, RETAIL TRADE, RESTAURANTS AND ACCOMMODATION SECTOR (SIC 6) ESTIMATES

6.2.1 Introduction

In terms of the research problem formulated for the purposes of this study and the conceptual framework shown in Chapter 2, the question to answer is if the wholesale- trade, retail trade-, restaurants- and accommodation sector total size is accounted for in the GDP. Is the size of the wholesale-, retail trade- hotel- and accommodation sectors' over-/underestimated? Are all informal wholesale-, retail trade- hotel- and accommodation, small-scale wholesale-, retail trade- hotel- and accommodation and illegal wholesale-, retail trade- hotel- and accommodation activities included in the total wholesale-, retail trade- hotel- and accommodation sector?

This wholesale-, retail trade- hotel- and accommodation sector discussion consists of the current estimations, followed by the new estimations, total measurements of illegal and informal activities, the evaluation between the current estimates and the new estimates, and lastly, the conclusion and limitations encountered when measuring the informal sector, small-scale wholesale-, retail trade- hotel- and accommodation sector and NOE activities.

6.2.2 Current estimation of value added in statistical release published by Stats SA

In order to meet the first objective regarding the current size of the wholesale-, retail trade- hotel- and accommodation sector, the Standard Industrial Classification (SIC) is taken into account. According to the SIC, the wholesale-, retail trade- hotel- and accommodation sector includes wholesale, retail, hotel and accommodation services being provided within the boundaries of South Africa. The wholesale-, retail trade- hotel- and accommodation sector includes the wholesale and retail trade; repair of motor vehicles, motor cycles and personal and household goods; and hotels and restaurants. In line with the objective statement, this sector is only measured on one-digit level and subsectors are not measured. The size of the wholesale and retail trade sector, hotels and restaurants are measured according to the following formula:

SIC 6 = Wholesale- and retail trade sector rand, hotels and restaurants (Formal wholesale and retail trade sector + small-scale wholesale and retail trade sector, informal wholesale and retail trade sector + illegal wholesale and retail trade sector + formal hotels and restaurants sector + small-scale hotels and restaurants sector, informal hotels + restaurants sector and + illegal hotels and restaurants sector)

When considering the size of the wholesale and retail trade sector and hotels and restaurants sector according to the above equation, the existing estimates for the wholesale and retail trade sector and hotels and restaurants are obtained from two statistical releases. Firstly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP) 1st quarter 2016*", the table in use is GDP annual and regional Table 2016, worksheet "SUT 2011"; this represents a 10 x 10 supply and use table. Secondly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP)" 4th quarter 2014*", the table in use is Tables 4th quarter 2014.xls, worksheet "Use table 2011"; this represents a 64 x 105 supply and use table.

The difference between the two tables is firstly, that the 10 x 10 use table is merely a condensed version of the 64 x 105 use table. Secondly, the 10 x 10 use table includes the informal sector, small-scale manufacturing sector and illegal activities ***as part*** of the manufacturing sector, whereas the 64 x 105 use table shows the informal sector, small-scale manufacturing sector and illegal activities of all the sectors as ***one column*** in the statistical release. The assumption is made that the difference

between the two tables by sector represents the informal sector, own accounts sector and illegal activities.

Before determining the estimates of the 2011 calendar year, the 64 x 105 use table needs to be condensed to reflect a 10 x 10 use table as well. This allows the researcher to determine the difference between the two tables, the 10 x 10 and 64 x 105, and therefore, to calculate informal wholesale sector, retail trade sector, hotel and accommodation sector, small-scale wholesale sector and retail trade sector, and illegal wholesale, retail trade sector , hotel and accommodation sector activities separately for each sector. A problem exists when comparing the two tables, 10 x 10 use table (published 2016) and – after condensing – the 64 x 105 use table (published 2014) to a 10 x 10 use table. It is notable that the two tables differ in IC, value added and output. The reason for this is that the 10 x 10 use table was revised in 2016, although it is not mentioned which sector was revised. To accommodate for this revision of the 10 x 10 use table (2016) intermediate consumption, value added and output, the 64 x 105 use table (2014) is revised and compressed to a 10 x 10 use table. The assumption is made that the revision is added to the informal wholesale sector, retail trade sector hotel and accommodation sector, illegal wholesale and retail trade, restaurants and accommodation sector and own account wholesale and retail trade sector, restaurants and accommodation sector.

The second step is to determine the difference between the two tables. This represents the informal wholesale -, retail trade sector, hotel- and accommodation sector, the illegal wholesale and retail trade sector, hotel- and accommodation sector, and the own-account wholesale- and retail trade sector, hotel- and accommodation sector. This difference being that the revised 10 x 10 use table published P0441 GDP 1st quarter (2016) value added is R404 469 million, whereas the 64 x 105 use table, when condensed to a 10 x 10 table, value added is R326 110 million, which then is equal to a revised amount of R78 359 million. This amount reflects the current estimations for the 2011 informal wholesale- and retail trade sector, hotel- and accommodation sector, the illegal wholesale and retail trade sector, restaurants and accommodation sector, and the own-account wholesale and retail trade sector.

Table 6.1: Wholesale, retail trade, accommodation and restaurants NOE sector for 2011 (R' million)

	Revised 10 x 10 supply and use table published in P0441 GDP 1st quarter 2016	Translated 64 x 105 translate in 10 x 10 use table (2014)	Wholesale and retail trade NOE sector
Intermediate consumption	298 011	280 488	17 523
Total gross value added	404 469	326 110	78 359
Total output at basic prices	702 479	606 598	95 881

Source: Statistics South Africa (release No. P0441, 4th 2014)

This table reflects the portion that is allocated to the informal, small-scale and illegal sector in the wholesale and retail trade sector. Thus, intermediate consumption (IC) is calculated by subtracting the values in the 2014 condensed 10 x 10 table from the values in the 2016 revised use table. The IC for the wholesale and retail trade for 2011 is therefore R17 523 million, value added totals R78 359 million, and output is equal to R95 881 million. This current IC, value added and output data for the wholesale and retail trade sector, and the informal, small-scale and NOE activities is compared under point 4 with the new estimates for 2011.

The following section determines the 2016 wholesale and retail trade informal, small-scale and illegal sector IC, value added and output. A release by Statistics South Africa is considered, namely Release No. P0441, "*Gross domestic product (GDP) 4th quarter 2017*", Annual, quarterly and regional fourth quarter 2017.xls tables are used, worksheet "SUT 2016"; this represents a 10 x 10 use table and worksheet "use table 2016 (64_105)" that represents the larger use table. The 2016 data is not revised; thus, the two releases are used as is. The 64 x 105 use table, is just condensed to a 10 x 10 use table. Determining the difference between the two 10 x 10 use tables it indicates the portion that is allocated to the SIC 6 informal sectors, own account sector and NOE activities sector, see table below.

Table 6.2: Wholesale, retail trade, accommodation and restaurants, informal sector, small-scale sector and illegal sector for 2016 (R' million)

	Use table 10 x 10 published P0441 GDP 1st quarter 2016	Supply and use table 64 x 105 condensed to 10 x 10 use table	Difference between two tables reflects the wholesale and retail trade illegal sector
Intermediate consumption	447 556	424 157	23 399
Total gross value added	578 213	460 631	117 582
Total output at basic prices	1 025 769	884 786	140 981

Source: Statistics South Africa (release No. P0441, 4th quarter 2017)

The above table represents the 2016 data that is allocated to the informal wholesale and retail trade sector, the small-scale wholesale and retail trade sector, and the illegal wholesale and retail trade sector activities. This current IC, value added and output data for the wholesale and retail trade informal, small-scale and NOE activities is compared under point 5 with the new estimates of the informal wholesale and retail trade sector, small-scale wholesale and retail trade sector and the illegal wholesale and retail trade sector activities for 2016.

The following section represents the new calculation of the informal wholesale and retail trade sector, the small-scale wholesale and retail trade sector, and the illegal wholesale and retail trade sector activities for the reference years 2011 and 2016.

6.2.3 New calculations of the wholesale and retail trade sector informal, small-scale and illegal activities (SIC 6)

This section covers informal sector and illegal sector of the wholesale-, retail trade- hotel- and accommodation sectors. The various methods used to determine the illegal activities are discussed under the appropriate sector. The reason for this is because not all sectors use the same methodology to determine NOE.

6.2.3.1 Informal wholesale trade, retail trade, accommodation and restaurants sector

To measure the number of wholesale trade, retail trade and restaurants' informal workers, three published documents are used to establish the output, IC and value added. The publications comprise of an article by Davies R. & Thurlow J. (2009:6), "*Formal-informal economy linkages and unemployment in South Africa"*, the Statistics South Africa Release No. P0211, *Quarterly labour force survey*, Table 3 (2018:56), and Statistics South Africa Release No. P0277, *Quarterly employment statistics*, Table G.

To determine figure for the 2011 calendar year: The data in Statistics South Africa release No. P0211, *Quarterly labour force survey*, Table 3 (2018:56), and Statistics South Africa release No. P0277, *Quarterly employment statistics*, Table G, is provided on a quarterly basis, thus, the average number of employees and the average salary over a period of the four quarters are used. The output for 2011 is therefore 1 063 000 (average number of employees) multiplied by R7 713 (average monthly earnings) multiplied by 12 (to obtain annual salary) divided by R million (to obtain data in millions),

which equals R98 342. The IC is calculated by using the ratio of the IC (informal and NOE activity sector) towards the output of the informal and NOE activity sector for the year 2011. To determine the IC of wholesale trade, retail trade and restaurants, the ratio of the IC to output is used (*Statistics South Africa release No P0441, 4th quarter SUT 64_105 column informal, NOE economy activity*), which is 34,7%. Thus, IC is 34,75% of output and equals R34 124. Value added is output (R98 342) minus IC (R34 124), which equals R64 217.

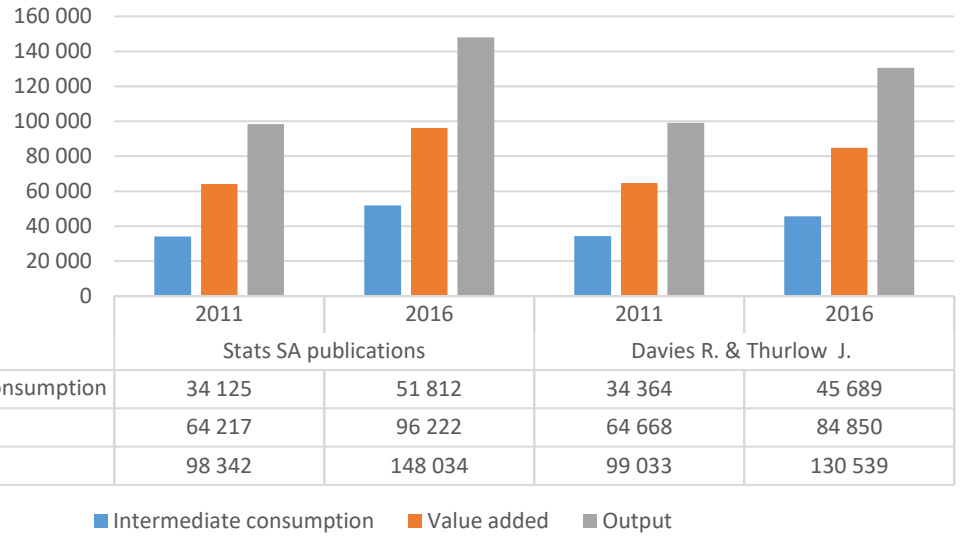
To support these calculations for the IC, output and value, the same methodology is used in the publication of Davies R. & Thurlow J. (2009:6), "*Formal-informal economy linkages and unemployment in South Africa*". The number of informal workers is multiplied by the average salaries of workers in the wholesale and trade sector and restaurant services. Only the informal employers are considered, although the authors make it clear (2009:7) that the informal sector consists of informal employment workers, informal sector workers, skilled workers, semi-skilled workers and unskilled workers. Informal workers are your normal street vendors, skilled workers in the informal sector are those workers who have the skills (e.g. baking) and who deliver a service but who can work for themselves, while unskilled workers can work in the informal sector but do not have skills. In these calculations, the informal sector workers are considered, as the other workers are seen, as own-account workers. The assumption is that the average monthly salary increases with CPI, but the number of employees remains stagnant. The number of employees for the year 2011 are 877 000 multiplied by the monthly income of R9 411 multiplied by 12 (yearly salary), which equals R99 033; this is the output. To determine the IC of the wholesale trade, retail trade and restaurants, the ratio of IC (R116 585) to output (R335 804) is used, which is 34,7%. Thus, IC is 34,75% of output, and equals R34 364. Value added equals output minus IC.

To determine the figures for the 2016 calendar year: Based on Statistics South Africa publications, the output for 2016 is 1 505 000 (average number of employees) multiplied by R11 747 (average monthly earnings) multiplied by 12 (to obtain annual salary) divided by R million, which equals R148 034. The IC is calculated by using the same ratio of the IC (informal and NOE activity sector) towards the output of the informal and NOE activity sector for the year 2016. To determine the IC of the wholesale and retail trade, the ratio of IC to output is used, which is 35%. Thus, IC is 35% of output, which equals R51 812. Value added is output (R148 034) minus IC (R51 812), which equals R96 222.

To determine the 2016 year, the article by Davies R. & Thurlow J. (2009:6) is taken into account. Davies suggests that salaries increase with the consumer price and the number of employees remains the same. The number of employees for the year 2016 is 877 000 multiplied by income of R12 405 by 12 (yearly salary), which equals R130 539. This is the output. To determine the IC of wholesale- and retail trade sector the ration of IC (R116 585) to output (R335 804) is used, which is 35%. Thus, IC is 35% of output and equals to R45 689. Value added equals output minus IC.

Graph 6.1 indicates the two different measures that are used between Statistics South Africa and the author's data.

Graph 6.1: Measuring the informal sector of SIC 6 taking two different sources for reference period 2011 and 2016 (R' million)



	2011	2016	2011	2016
	Stats SA publications		Davies R. & Thurlow J.	
Intermediate consumption	34 125	51 812	34 364	45 689
Value added	64 217	96 222	64 668	84 850
Output	98 342	148 034	99 033	130 539

The data in graph 6.1 indicates that the two measures are quite in line with each other. The researcher took the decision that to determine the informal sector, Statistics South Africa's published data method is used. The table above indicates the value added for the years 2011 and 2016 in use. A further discussion that forms part of the informal sector is own-account wholesale trade, retail trade and restaurants.

6.2.3.2 Own-account wholesale trade, retail trade, accommodation and restaurants sector

The own-account wholesale trade, retail trade and restaurants sector is defined as trading by the owner to obtain an income for him-/herself, and it can also include restaurants and accommodation services provided by the owner from the premises. Some of these activities have lately become a very

profitable business, e.g. people who provide accommodation for students. According to the Statistics South Africa survey (2013), Release No. P0276, "*Survey of Employers and the Self-Employed*", table 18, own-account workers are non-VAT registered businesses that are small in nature, with no employees or less than five employees. In this research on retail trade, wholesale trade and restaurants, own-account is calculated by using the aforementioned release. The net profit data is used for own-account workers.

According to this release (table 18), the last calendar month showed that own-account owners had a net profit of R18 705 million (2013). The last calendar month means the month prior to when the survey was conducted. To determine the annual profit, the monthly profit is multiplied by 12.

The disadvantage of this publication is that it is a fourth-yearly publication; thus, the publication is for 2009 and the next publication covers 2013. To determine the data for 2011 and 2016, the average growth rate of wholesale trade, retail trade, accommodation and restaurants sector, based on release No. P0441 by Statistics South Africa, is used. The average growth rate amounted to 7% and in order to determine the 2011 and 2016 data, the amount of R18 705 (2013) is used with a growth rate of 7% backwards for 2011 (R16 177), and for 2016, forwards from 2013 with growth rate of 7%, which amounted to R22 914.

IC has not been calculated because net profit is measured, and value added is output minus IC.

Table 6.3: Measuring value added of own-account wholesale trade, retail trade, restaurants and accommodation (R' million)

	2011	2016
Intermediate consumption	0	0
Value added	16 177	22 914
Total output at basic prices	16 177	22 914

Source: Statistics South Africa release: P0276

The table shows a steady increase between 2011 and 2016; this can be based on the growth rate of 7% that is used. However, the likelihood does exist that this amount is underestimated. The reason for this is that the data is based on a sample survey that is conducted mostly in rural areas and not all own-account businesses are recorded, as they are unknown. The reluctance of people to declare own businesses also exists because they do not want to pay tax.

6.2.3.3 Illegal wholesale trade, retail trade, accommodation and restaurants sector

The 2008 SNA: 48 indicates that illegal transactions should be treated the same as legal transactions, as there is mutual agreement between parties to trade products or deliver a service. The output forms part of the production process and should be recorded in national accounts. According to the international guideline by Eurostat (2018), the following items form part of the illegal trade sector: Illicit trafficking or smuggling of firearms, stolen goods, migrant smuggling, infringement of intellectual property rights, illegal trade in drugs and alcohol, illegal trade in cigarettes, etc.

6.2.3.3.1 Illicit trafficking of firearms

According to Eurostat's (2018:45-46) a firearm is any portable weapon, also known as a gun that can shoot a bullet. Furthermore, this forms a very small part of illegal trade but is highly profitable. When reporting it as part of illegal trade, it is seen as the price of the firearm multiplied by the number of illegal trades of firearms; thus, output. Intermediate consumption (IC) is calculated as a percentage of IC to output, as data is unknown. For 2011, IC represents 18% of output and for 2016, it represents 20%. Value added equals output minus IC.

To determine the price of the firearms, the guideline of Eurostat (2018) is used. Firstly, it indicates that the fencer pays approximately 40%–50% of the wholesale price, but the price always depends on supply and demand. The 40%–50% is a rule of thumb. According to an article (2016) "How safe is it to buy a gun in South Africa",[67] a good second-hand gun can be obtained for R1 500, although a new one's price is approximately R9 500. The price of firearms is determined from a news article from News24"[68]. To determine the price of a gun, R1 500 is multiplied by 40% (wholesale price), which is equal to R600 per illegal weapon in 2016. It is acknowledge that the price of R600 for a rifle/gun/firearm/revolver is too low, as there is not only rifles in circulation for illegal weapons but also automatic weapons. However, the researcher refers to the "rule of thumb" (OECD 2018:48) and underestimates rather than overestimates the value of illegal fire arms.

[67] https://www.reddit.com/r/southafrica/.../how_easy_is_it_to_buy_a_gun_in_s
[68] https://www.news24.com/MyNews24/The-real-cost-of-self-defence-firearms-20150416

The number of illegal firearms in circulation is based on an article by Allard D. & Burch V.C. (2008), "The cost of treating serious abdominal firearm-related injuries in South Africa". This article indicates that approximately 1 million illegal firearms are held by citizens in South Africa.

To determine data for 2016, the output of R600 (price per firearm) is multiplied by 1 million (number of illegal firearms), which equals R600 million. Intermediate consumption (IC) is calculated as a percentage (see first paragraph under this heading). IC is 600 multiplied by 20% which is equal to R120 million. Value added is therefore R600 million minus R120 million, thus R480 million.

Output for 2011 is calculated by taking the 2016 price of R600 as a base price and adjusting it backwards with the growth rate in the SAPS data from 2011 to 2016, using the growth rate of illegal possession of firearms. The growth rate between 2011 and 2016 equals 2,6%. The price for 2011 (after taking the growth rate into account) amounts to R584 per firearm. The assumption is that the number of firearms remains stagnant, as no new data is available. To determine data for 2011, the output of R584 (price per firearm) is multiplied by 1 million (number of illegal firearms), which equals R584 million. Intermediate consumption (IC) is calculated as a percentage, so IC is 600 multiplied by 18%, which equals R105 million. Value added equals R584 million minus R105 million; thus, R479 million.

Table 6.4: Measuring value added for illegal firearms trafficking for 2011 and 2016 years (R' million)

Year	Output	Intermediate consumption	Value added
2011	584	105	479
2016	600	120	480

The table indicates that the value of illegal firearms almost remained the same; the main reason being that the percentage of 2011 for IC is 18%, whereas for 2016, IC represents 20% of output. Although statistics do indicate that robbery, car hijacking, robbery of cash in transit and bank robbery did increase between the years 2011 and 2016, and it is known that these types of crimes normally are committed by using firearms, the table does not really reflect an increase. Taking this into consideration, it can be stated that the illegal trafficking of firearms is underestimated and cannot be measured precisely.

6.2.3.3.2 Car theft

Data pertaining to stolen goods (or theft) is based on the international guidelines of the OECD (2002:153), Eurostat (2018:48). The guidelines include theft because the selling of goods is seen as a mutual agreement between two persons. The international guidelines also indicate that theft with regard to money is excluded. The OECD and Eurostat indicate that theft that refers to cash in transit and bank robbery is not a mutual agreement between two parties. The reason is the lack of an agreement between two people and the money that is stolen is already in the economy. The recommendations from the OECD (2002:153) are that these activities lead to double counting and should not be recorded as part of stolen goods/theft. According to OECD (2002:154), the value of stolen goods is seen as income and thus, output.

Measuring the theft of goods other than cash is always difficult, because little data is available for activities that are illegal. According to Eurostat's (2018:50) "Dutch study", theft in proportion sold by fencers is 100% for cars, burglary is 66% and losses to companies are 80%. In this section, the following thefts are discussed: Car theft, truck theft, burglary, and livestock theft. In the case of theft, SAPS data is used. This data is published in annual reports and some thefts discussed are based on administrative data. When using administrative data, it is mentioned by referring to different authors' research.

6.2.3.3.2.1 Car theft

The methodology used in this regard is based on Eurostat's (2018:50) "Dutch study" that used administrative data together with Eurostat guidelines. According to these guidelines, output is the income received from a stolen car, IC consumption is the value that is paid to obtain the stolen vehicle, and value added is output minus IC.

Car theft consists of three parts: The car can be stolen and then re-registered (sold to a second-hand dealership), or it can be sold to "chop shops" for parts, or cars are stolen and then exported. Based on an article titled "Business Against Crime South Africa (BACSA)", by Burgers F. et.al (2007:99), "National initiatives to prevent and combat vehicle crime", approximately 30% of vehicles are exported to other countries, 20% end up in "chop shops" for selling parts and the rest (50%) are re-registered in the market. The assumption is that most of the cars are in good condition when stealing

it. It is important to note that stolen vehicles are also imported into South Africa; these vehicles are not accounted for because data is unknown.

The data to determine the number of cars stolen is obtained from the SAPS' annual report. The number of cars stolen was 68 271 (2011) and 70 024 (2016). The following table measures the number of vehicles that ended up in different trade methods.

Table 6.5: Measuring the number of vehicles in different illegal trading methods

Year	Number of vehicles stolen per calendar year[69]	Number of vehicles exported to other countries[70]	Number of vehicles sent to chop shops[71]	Number of vehicles used for reselling[72]
2011	68 271	20 465	13 643	34 109
2016	70 024	21 007	14 005	35 021

To determine the value added, IC and output, the three trading methods are dealt with separately.

Vehicle stolen in South Africa and exported – The output for vehicles that are stolen in South Africa but exported to neighbouring countries is calculated by taking the number of cars (20% of total) stolen, multiplied by the price the thief receives. The money received by the thief is also seen as output. IC is zero, as the car is stolen, and no cost are involved. Value added is output minus IC.

The output for vehicles sold for export is determined by taking the average price that a person receives when stealing the car. In 2012, a car thief received anything between R3 000 to R30 000,[73] depending on the type of car. As data on the type of car is not available, the average price of R16 500 (R3 000 plus R30 000 divided by 2) is used. To adjust data for the 2011 and 2016 years, the assumption is made that the average price of cars increased by 4%. This 4% is derived from an article by Stander HJ. & Brink JC. (2016:37), "*Perspective of the future of personal transport in South Africa*". Based on the price adjustment, the price that the thief receives for a car is R15 840 (2011) and R21 007 (2016); this is seen as output.

To measure the output for 2011, the number of vehicles stolen (20 465) is multiplied by the average price per vehicle (R15 840), which equals R324 million. IC equals zero and value added is output minus

[69] SAPS annual report
[70] Number of vehicles multiplied by 30% to obtain number of vehicles stolen for exporting to neighbouring countries
[71] Number of vehicles multiplied by 17% to obtain number of vehicles stolen for chop shops, thus sold for parts
[72] Percentage of vehicles for reselling in the country amounted to 50%
[73] https://www.iol.co.za/motoring/sector-news/two-thieves-tell-how-they-do-the-job-1222795

IC. Output for 2016 is 21 007 (number of vehicles) multiplied by R19 302 (price per vehicle), which equals R405 million. IC equals zero and value added is output minus IC. The table below indicates the value added of vehicles that are exported to other countries.

Table 6.6: Measuring the output of stolen vehicles exported to neighbouring countries

Year	Number of vehicles exported to other countries[74]	Price received by thief (rand)	Output (R million)
2011	20 465	15 840	324
2016	21 007	19 302	405

The values added for 2011 and 2016 are added to all other illegal activities. Another part of car theft is the portion that is sold to "chop shops".

Vehicles stolen in South Africa and sold to "chop shops" – The output of vehicles sold to "chop shops" is determined by the number of cars stolen, as indicated by the SAPS report, multiplied by the average price of the cars, multiplied by 69%.[75] The 69% is based on the National Insurance Crime Bureau (NICB) that provided a guideline on what thieves receive when they sell stolen cars for parts. It indicates that a person who buys a stolen car receives 69% of the retail value when selling the parts separately. The average price of a car is obtained from a survey done by Wesbank[76] in 2017. The survey indicates that the average price of cars financed by Wesbank is R269 006 (2017). To determine the values for 2011 and 2016, the 2017 year is adjusted backwards to 2011 and 2016 with 4%. The price of a car is R210 566 (2011) and R258 245 (2016). Thus, output for 2011 is R210 566 multiplied by the number of cars (13 643), divided by a million, which equals R2 872 million. Values for 2016 will once again be determined by the number of cars (14 005) multiplied by the price (R258 245), divided by a million, which equals R3 617 million.

IC is determined by the amount the buyer pays to obtain the stolen car; this is based on the aforementioned assumption that the thief receives R15 840 (2011) and R19 302 (2016). Thus, IC is determined by the number of vehicles sold to chop shops multiplied by the payment to the thief, e.g. 13 643 (number of vehicles stolen) multiplied by R15 840 (the price the thief receives) divided by a

[74] Number of vehicles multiplied by 30% to obtain number of vehicles stolen for exporting to neighbouring countries
[75] http://bestride.com/news/see-how-much-car-thieves-make-selling-your-car-for-parts
[76] https://businesstech.co.za/news/motoring/240203/how-much-money-south-africans-spend-when-buying-a-used-car/

million, which equals R216 million. The values for 2016 will be 14 005 (vehicles sold to chop shops) multiplied by R21 007 (the price) divided by a million, which equals to R294 million (IC).

Value added is output minus IC.

Table 6.7: Measuring the value added of stolen vehicles sold for spares for 2011 and 2016

Year	Number of vehicles sent to chop shops[77]	Average price of car (rand)	Output (R' million)	Intermediate consumption (R' million)	Value added (R' million)
2011	13 643	210 566	2 873	216	2 657
2016	14 005	258 245	3 617	294	3 322

The values added to the economy for selling parts of stolen cars are R2 657 million (2011) and R3 322 (2016). The following section, which also forms part of stolen cars, deals with vehicles that are stolen and then re-registered, and from the economy point of view, are seen as second-hand cars.

Vehicles stolen in South Africa and re-registered – The output of vehicles that are sold in order to be re-registered is determined by the number of cars stolen, as indicated by the SAPS report, multiplied by the average price of the cars received, multiplied by the rule of thumb indicated in the Eurostat (2018:48) international guideline. The rule of thumb indicates that professional thieves receive about 40% to 50% of the wholesale price. In this thesis, the rule of thumb applied is 40%. This assumption is based on the fact that South Africa is a third-world country and therefore the lower percentage is considered. The number of cars stolen for re-registration is 34 109 (2011) and 35 021 (2016). The average price of a car is obtained from a survey done by Wesbank[78], and amounts to R210 566 (2011) and R258 245 (2016). This price is multiplied by 40% for the rule of thumb. Output for 2011 is determined by taking 34 109 (number of cars), multiplying this by R210 566 (price of car), multiplying this by 40%, and dividing by a million, which equals R2 873 million. Output for 2016 is determined by taking 35 012 (number of cars), multiplying this by R258 245 (price of car), multiplying this by 40%, and dividing by R million, which equals R3 617 million.

To determine the IC, the number of cars for each respective year is multiplied by the price the buyer pays for car. Values for 2011 are 34 109 (number of cars), multiplied by the price the buyer pays for

[77] Number of vehicles multiplied by 17% to obtain number of vehicles stolen for chop shops, thus being sold for parts
[78]https://businesstech.co.za/news/motoring/240203/how-much-money-south-africans-spend-when-buying-a-used-car/

the car (R15 840), divided by R million, which equals R540 million. Values for 2016 are determined by taking 35 012 (number of cars), multiplying this by the price the buyer pays for car (R21 007), divided by R million, which equals R735 million.

Value added is equal to output minus IC.

Table 6.8: Measuring the output of stolen vehicles that are re-registered value added

Year	Number of vehicles sent to chop shops[79]	Average price of car (rand)	Output (R' million)	Intermediate consumption (R' million)	Value added (R' million)
2011	34 109	210 566	2 873	540	2 333
2016	35 012	258 245	3 514	735	2 778

When one adds these three tables together, the value added to the economy only for stolen vehicles is R5 313 million (2011) and R6 542 million (2016). The following section covers stolen trucks.

6.2.3.3.2.2 Truck theft

The same assumptions and methodology used for theft of cars are applied to truck theft. According to Eurostat (2018:50), the "Dutch Study" is used. Output, value added and IC are measured in the same way as car theft is measured. According to *Truck and Heavy Equipment Magazine*[80], prices differ as far as model and type of trucks are concerned. The size of trucks also has an impact on the price. To determine the output of trucks, the number of trucks stolen is multiplied by the value of the trucks. The number of trucks stolen is taken from the SAPS annual statistics report whereas the price is obtained from *Truck and Heavy Equipment Magazine* data. The price of trucks is determined by the average price of all trucks mentioned on the *Truck and Heavy Equipment Magazine* website.

The number of trucks stolen was 821 in 2011 and 1 184 in 2016. Determining the price of these vehicles is more difficult, as truck prices vary from R246 000 to R200 0000. In this case, the assumption is made that an average price should be established in order to determine the output and value added. The prices are not available from NAAMSA, thus the prices of *Truck and Heavy Equipment Magazine* are used. The average price of trucks for 2018 was R946 501. To determine the 2011 price, the price is decreased, based on growth rates of the retail sector (SIC 6) as obtained from

[79] Number of vehicles multiplied by 17% to obtain number of vehicles stolen for chop shops, thus being sold for parts
[80] https://trucksmag.co.za/south-african-new-truck-prices

Statistics South Africa, release No. P0441 – Gross Domestic Product (GDP), 4th Quarter 2013 table, "Use table" and P0441 – Gross Domestic Product (GDP), 1st Quarter 2016, " table 10 x10". The average growth rate between the years is 0,7%. The average price for a truck is therefore determined as being R569 510 (2011) and R818 628 (2016).

The methodology is based on the Eurostat (2018:50) "Dutch study" that uses administrative data together with Eurostat guidelines. According to these guidelines, output is the income received from stolen trucks, and IC is the value that is paid to obtain the stolen vehicle. In this case, data is unknown on what the value is paid for a stolen truck. To avoid overestimation, stock that is stolen together with the truck has not been measured.

To determine the output, the number of stolen trucks is multiplied by the price and divided by R' million to obtain a value in millions. Measuring 2011, the price of trucks was R569 510, multiplied by 821 (number of trucks stolen) divided by R million, which equals R467 million. To determine the output for 2016, R818 628 (price for truck) is multiplied by 1 184 (number of trucks stolen) divided by R million, which equals R969 million.

According to the Eurostat (2018:50) guidelines, only 30% of the retail price is paid for stolen vehicles. The same assumption is applied for trucks. The assumption is that for 2011, the R467 million is multiplied by 30%, which equals R140 million. To determine the values for 2016, the price of R969 million is multiplied by 30%, which equals R290 million.

To determine the IC, the same ratio of stolen cars is used for IC to output. In the 2011, IC represented 18% of output, whereas in 2016, IC represented 21% of output. Value added is output minus IC.

Table 6.9: Measuring value added for stolen trucks (R' million)

Year	Output	Intermediate consumption	Value added
2011	140	26	113
2016	290	61	229

The value added for stolen trucks is R113 million (2011) and R229 million (2016), although this can be an underestimation. Trucks are mostly hijacked for the stock they carry, although the stock has not been taken into account and no heavy equipment that is stolen is taken into consideration. The

data is not split as in the case of cars, as data is unavailable of when trucks end up in a chop shop or are exported.

6.2.3.3.2.3 Theft/burglary

Eurostat (2018) mentions two different kinds of household theft, namely burglary and robbery. Robbery is defined as the instance when robbers forcefully, unlawfully and deliberately take property that belongs to another person. House robbery takes place when people are provoked in their house and are victims of theft. The OECD (2002:153) treats theft/burglary the same as vehicle theft. The same rule that applies to car theft, applies in this case, namely that it is a mutual agreement between two people, and thus it is a transaction and should be recorded. The OECD (2002) and Eurostat (2018) describe some methods to measure value added. However, using SAPS data is not feasible, as the value of stolen goods is not available, only the number of cases. Furthermore, some people do not even report theft to the police, especially if the vehicle was not insured, and because the perception is that police are reluctant to investigate cases. A second option is to use some research that has already been done, and a third option is to use administrative data. For the purposes of this research, a combination of the last two options is used.

The methodology that is followed is an analytical study, and publications from Statistics South Africa, international guidelines and administrative data are used. The publication of Statistics South Africa (2014/2015:7), Release No. P0310, "*Living conditions of households in South Africa, An analysis of household expenditure and income data using the LCS 2014/2015*" indicates the value spending by households on goods. The assumption is that robbers steal a list of goods such as food, non-alcoholic and alcoholic beverages, tobacco, clothing, footwear, housing utilities, furnishings and household equipment. This release indicates that a household spends 31% (2011) and 40% (2014/2015) on this list of household goods. To determine the values for the 2016 calendar year, the growth rate of value added between 2015 and 2016 is taken into consideration; this is based on the Statistics South Africa, Release No. P0441,"*Gross domestic product (GDP) 4th Quarter 2017*", for the catering and accommodation sector, and it amounted to 6,2% growth. When the growth rate of 6,2% is applied, households spend 42% on the above list of household items.

To determine the output, a couple of steps are involved. Firstly, the percentage that a household spends on household goods needs to be determined. According to Statistics South Africa

(2014/2015:7), Release No. P0310, households spend 30,97% on the above list of household goods in 2011, and 42% in 2016 out of their total household expenditure.

The second step is to measure the wealth of a household. Wealth is obtained from administrative data in an article from BusinessTech[81] where data was extracted from business in the Momentum/Unisa Household Wealth Index. The wealth of a household is used, as it is an indication of assets that belong to a household. The wealth of a household in South Africa is measured as R114 547 (2015) and in R103 229 (2010). To adjust this data for 2011 and 2016, the growth rate of 6,2% is used. The wealth is determined at R109 629 for 2011 and R121 648 for 2016.

The third step is to multiply the household's spending on household goods as mentioned above multiplied by wealth; this measures the spending on the portion in rand value of household goods. Therefore, to measure 2011 wealth, R109 629 is multiplied by 30,97%, which equals R33 950, and for 2016, R121 648 is multiplied by 42%, which equals R51 092.

The fourth step is to measure the percentage crime a household experiences; this is obtained from Statistics South Africa, report No. 03-40-04:10, "*Crime Statistics Series Volume 4, Exploring the extent and circumstances surrounding housebreaking/burglary and home robbery. An in-depth analysis of the victims of crime survey data*". This report states that 13% of households experienced crime in 2011, and 22% experienced crime in 2016. This percentage is multiplied by R33 950 (2011) and R51 092 (2016). The rand value in loss of household goods (using the percentage of crime multiplied by the value) equals R4 413 (2011) and R11 240 (2016).

Lastly, according to Eurostat (2018:50), a fencer only sells approximately 66% of stolen goods at a retail value of 30% to 40%. In this thesis, the lowest percentage (30%) is taken.

To determine the output for robbery/burglary for 2011, the wealth value of R109 639 is used and multiplied by the percentage spending (30,97%) on the list of household goods. This equals the value of stolen goods from a household (R33 955). This amount is multiplied by the percentage (13%) of people who experienced crime in that specific year. Thus, R33 950 multiplied by 13% equals R4 413 million loss of goods. According to the Eurostat document, a fencer sells goods at a retail value of 30%. Therefore, R4 413 million multiplied by 30% equals R1 323 million. Furthermore, only 66% is

[81] https://businesstech.co.za/news/general/99654/how-rich-is-the-average-south-african/

sold, thus output equals R873 million. This amount is seen as value added. No intermediate consumption is taken into account as only retail is calculated. Value added is output minus IC. The 2016 year is calculated the same as 2011 output and value added.

Table 6.10: Measuring the value added of burglary and robbery for 2011 and 2016

Year	Wealth SA house-hold (rand)	Household spending (%)	Household spend on list of household goods	Experience crime (%)	Value of household goods stolen (R million)	Sold at a 30% retail price (R million)	Sold 66% of value by fencer equals output and value added
2011	109 639	30.97	33 955	13	4 413	530	874
2016	121 648	42,00	51 092	22	11 240	3 372	2 225

The table reflects the 2011- and 2016-years' losses of households and is seen as output and value added. The 2011 output and value added amounted to R874 million, whereas the 2016 output and value added equals R2 225 million. The following discussion is on theft of livestock.

6.2.3.3.2.4 Theft of livestock

The OECD (2002) recommends that the theft of livestock forms part of the calculations under the heading of theft. Theft of livestock must be studied with care, as different factors can influence the price of livestock, e.g. inflation, red meat prices or prices per head of livestock.[82] Further factors that can influence the value added is the type of livestock. The main concern is that the SAPS statistics only mentions the number of cases but not the value of livestock stolen. Data could be obtained from an article by Agri-Orbit (2018), "The economic impact of stock theft" [83], in which it is indicated that in 2011 the loss in cattle, sheep and goats amounted to R486 million (2011) and R568 million (2016). This is seen as output and value added.

Table 6.11: Measuring the value added for livestock theft for 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011	468	0	468
2016	568	0	568

[82] https://agriorbit.com/economic-impact-stock-theft-south-africa/
[83] http://www.bizcommunity.com/Article/196/358/174795.html

The above table reflects data as is, from the article. No adjustments were made as the article indicates that the recovery of livestock has already been excluded from these figures. It should be noted that this could still be an underestimation, as other livestock is not taken into account, such as wild animals, chickens, bucks, etc. The trade in rhino horns is discussed later on in this section, as the mark-up is substantially higher.

6.2.3.3.2.5 Stolen inventories and shoplifting

According to Eurostat (2018:50), shoplifting and theft from inventories form part of retail and trade because the assumption is that people who steal products will sell these for a mark-up. Shoplifting and theft of stock are defined as stealing from a retail store or from inventories that are held by a retailer. According to Eurostat (2018), 80% of the stock stolen from companies is sold by the fencer at a value of 30% of the retail value.

In an article by Cant M.C. & Nel E.C. (2012), the business turnover can be lower (between 5% and 7%) because of theft. The author indicates that because of increasing poverty and unemployment, people need to find alternative ways to supplement the goods they need, and one is shoplifting and stealing of inventories. They identified employee theft (43%), external shoplifting (30%), poor paperwork and control (23%), and vendor theft (3%). Although this percentage is available, the value of stock that is stolen from shops is not available.

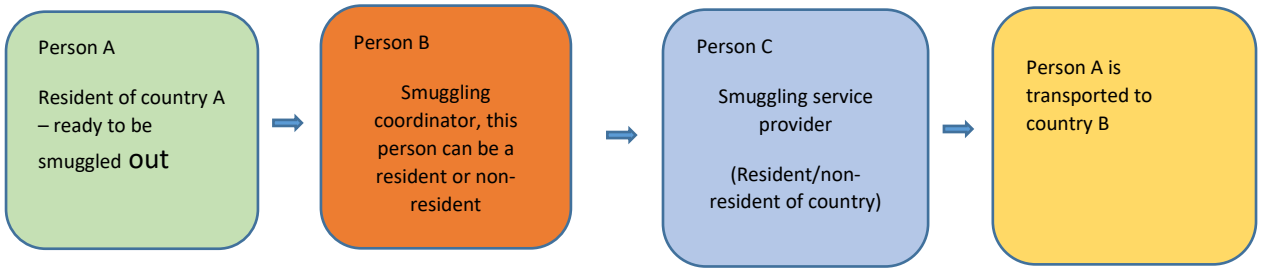
Lack of SAPS data makes it impossible to determine the value of shoplifting and theft of inventories. SAPS reports the number of cases only, and not the actual value of stolen goods. The finding is that the researcher does not include this as part of the study and recommends further research to determine the exact value of losses by retail stores.

6.2.3.3.3 Migrant smuggling

Migrant smuggling is defined in the 2008 SNA (paragraph 6.44) as the illegal transportation in the form of smuggling of people and goods. Human trafficking is defined as modern-day slavery. It involves holding/transporting and recruiting people using violence, scams or force. The reasons people can be trafficked is for forced labour, prostitution or forced marriages, and for removing organs forcefully.

When the Eurostat (2018:55) data is taken into consideration, the price of a person being smuggled depends mostly on the country, the route of smuggling, gender, age demand and supply of people. According to the Eurostat (2018) guidelines, human smuggling forms a large part of illegal activities, and South Africa is one of the main routes that human trafficking goes through. The only problem is that no values are set on which person is paid what for smuggling humans. The South Africa National Human Trafficking Resource Line (SANHTRL) tries to control human trafficking. The figure below indicates the route that is followed for smuggling people, and the number of people being smuggled.

Figure 6.1: Basic model for migrant smuggling



Source: Eurostat (2018)

Although the model on how human trafficking takes place is available, the value added of South African human trafficking is not available. The researcher decided that, owing to the lack of data, the value added cannot be determined and therefore recommends that this issue should be reserved for further research. Several news articles refer to how many people are found and how many are missing, but the value of human trafficking is not declared.

6.2.3.3.4 Infringement of intellectual property (IP) rights

According to the book published by the World Intellectual Property Organization (WIPO), "*The enforcement of intellectual property rights: A case book*" IP is defined as the inventions, ideas, artworks, literature, patterns, trademarks, trade names, music, etc. that are owned by the creator when first created (2002:13). According to Eurostat (2018), the characteristics of piracy and counterfeiting goods are the infringement of goods through the normal process of production. The markets where these products are traded, are based on the supply and demand of products. Demanders are mostly unaware that the products that they buy are infringements; on the other hand, buyers can also demand counterfeit products. The reason for this is that they can sell it at a

lower cost to the retail value and gain more profit when it is obtained illegally. The Eurostat (2018) international guidelines accept the fact that data on these activities is limited (Eurostat 2018:60).

Eurostat recommends that counterfeiting and piracy activities should be recorded in official statistics. Market analysis indicates that actors can be placed in two groups. Firstly, those enterprises that pay tax and produce counterfeited products, although a civil legal issue exists. Secondly, illegal businesses that are not registered and do not pay any taxes but that trade in IP products. The Eurostat guidelines (2018:60) indicate that these activities should be captured as NOE. The recommendation is that the trade in counterfeit products where a legal transaction takes place, should be measured and not the values of copies provided to a friend. The reason is that no legal transaction is involved because no selling is taking place. (Eurostat 2018:61).

Data sources that can be used, as recommended by Eurostat (2018:60), are consumer surveys, company data and data of counterfeit production facilities. This guideline indicates that either data of seizures or global trade data can be used. This research turns to the global study as recommended by Eurostat (2018:61): "*Trade in Counterfeit and Pirated Goods: Mapping the Economic Impact*" to measure the value added to the economy.

The internationally published documentation by the Global Intellectual Property Centre (GIPC 2016), "*Measuring the Magnitude of Global Counterfeiting: Creation of a Contemporary Global Measure of Physical Counterfeiting"* is used to determine the value added of South African IP. According to this publication (GIPC 2016:13), the global estimates of physical counterfeit assign a value of $1 299 million to South Africa for counterfeit products. This amounts to 0,3% of the total global physical counterfeit data. Between 2012 and 2013, the value of seized counterfeit products by reporting economy amounted to $66 million (GIPC 2016:27). The document also indicates that data is not being provided by customs officials, and neither is it provided in a consistent manner, and therefore no breakdowns of the type of product exist (GIPB 2016:32).

To determine the output data in accordance with this publication (GIPC), US$ is converted into rand, in 2011 exchange rate was $1:R8,12. Determining the 2011 data, the $66 million is converted to rand; thus multiplied by R8,12 which is equal to R535 million. Intermediate consumption is very difficult to measure as it is an illegal activity and no guidelines are provided in the Eurostat (2018) guideline document. The assumption is made by the researcher that it is the same percentage, as the

percentage being used in the case of IC: Output in table 6.1 (R17 523 million divided by R95 881 million), and therefore IC equals R535 million multiplied by 18,3% is R97 million. Value added is output (R535 million) minus IC (97 million).

To determine the output for 2016, the conversion rate for 2016 was $1 =R13,71; thus, the amount is calculated as $1 299 multiplied by R13,71, which equals R17 809 million. IC is calculated by the percentage contribution for IC: Output; this amounts to 16,5% (table 58), and the amount is R2 398 million. Value added is output minus IC. The table below reflects the value added of IP rights.

Table 6.12: Measuring the value added of infringement of intellectual property (IP) rights for 2011 and 2016 (R' million)

Year	Output	Intermediate consumption	Value added
2011	535	97	438
2016	17 809	2 398	15 411

Source: Global Intellectual Property Centre (GIPC 2016)

When one looks at the figures in the above table, the first impression is that the growth between the two years is unusually high, but this is not the correct assumption. The following reasons must be considered: firstly, as technology grows at an extremely high speed, infringements of products become more regular and easier. Secondly, products in one country can be the original trademark, and can be copied in another country without importing the products, e.g. Nike running shoes. Thirdly, the trademark of person A can be illegally sold to person B, who is unaware that fraud has taken place. This data is taken directly from the report, and no adjustments are made. The assumption is made only in the case of IC. The following illegal trade is the trade in drugs.

6.2.3.3.5 Illegal trade in drugs

Illegal trade in drugs consists of all drugs, such as cannabis, hallucinogens (XTC or LSD), ecstasy, methamphetamines, cocaine, heroin and prescription stimulants. In section C (manufacturing sector), the manufacturing of drugs is calculated but no trade is involved; thus, only production cost is calculated. To determine the output on drugs, the mark-up price is seen as output, whereas the production cost is IC.

The international publication by the OECD (2002:156) gives guidelines on how to measure the output of drugs. The price is multiplied by the quantity usage, multiplied by the number of the population

using drugs. According to OECD (2002), the price of drugs is obtained by using police data, but should police data be lacking, research studies are a good indicator. In this thesis, research documents produced by different authors are a more feasible indicator, seeing that police statistics do not exist. Author's documents in use are Howell et al. (2015), "*The wrong type of decline: Fluctuation in price and value of illegal substances in Cape Town"* (this article is used to determine the street price of drugs); the UN World Drug Report (2014), "*Drug use statistics in South Africa"* (this report is used to determine the percentage of the population in South Africa that uses drugs); and lastly, the Statistics South Africa report on the midyear population estimates.

To calculate the output involves four steps: Firstly, establish the population size in order to determine the number of people using drugs. The size of the population is obtained from the Statistics South Africa release No. P0302, *Mid-year population estimates* (2018) that estimates the population size as 51,73 million for 2011 and 55,91 million for 2016 (see Table 5.9).

The second step is to measure the people using drugs. According to an article by Reagon (2016), "*Latest Drug Use Statistics – South Africa 2016",* which is based on the UN report, 3,74 million (2013) people of the total population are using some kind of drug. As this report is based on 2013 data, the population growth rates are used to determine the number of people using drugs for 2011 and 2016. Thus, the population using drugs are 3,63 million (2011) and 3,9 million (2016). These calculations are shown in table 5.10.

Thirdly, the percentage of the population using specific drugs needs to be determined, the reason being that each drug has a different price. This was measured in table 5.9 and is not calculated in this sector again.

Lastly, the output needs to be calculated, which is the price that a specific drug is selling for. The prices are obtained from a study by Howell et al. (2015), "*The wrong type of decline: Fluctuation in price and value of illegal substances in Cape Town"*. In this discussion, the mean price given by the author is taken into account, and no adjustments are made.

To determine the output of drugs, the number of people using drugs is multiplied by the price, equals output. In the table below, for example, the total population who uses drugs totals 3,63% (2011) and 3,92% (2016). If ecstasy is used as an example, only 0,3% of the 3,63% of the population who used

drugs in 2011, used ecstasy; thus, the percentage population that uses drugs is 0.01 million multiplied by the price (R105.40), which equals output R1,15 million.

Table 6.13: Measuring the output of the drug trade (R' million)

	% usage of drugs	Price of drugs (rand)	Population usage of drugs 2011 (million)	Population usage of drugs 2016 (million)	Total output in 2011 R' million	Total output in 2016 R' million
Total population using drugs			3,63	3,92		
Cannabis	38,4	120,00	1,39	1,51	167,23	180,74
Other/Mandrax	5,3	114,18	0,19	0,21	21,96	23,74
Hallucinogens (XTC or LSD)	3,2	180,00	0,12	0,13	20,90	22,59
Ecstasy	0,3	105,40	0,01	0,01	1,15	1,24
Methamphetamines	22,9	395,24	0,83	0,90	328,47	355,02
Cocaine	5,7	439,16	0,21	0,22	90,85	98,19
Heroin	18,8	800,00	0,68	0,74	545,82	589,93
Prescription stimulants	5,4	65,00	0,20	0,21	12,74	13,77
Total amount of drugs used					1 189,13	1 285,21

Total output for all drug usage amounted to R1 189 million for 2011 and R1 285 million for 2016. To measure the IC, the manufacturing output is seen as IC; thus, table 5.13 in Chapter 5. Table 5.13 reflects that IC is R906 million (2011) and R978 million (2016). The value added is calculated as output minus IC.

Table 6.14: Measuring value added for illegal drugs trade for 2011 and 2016(R' million)

Year	2011	2016
Intermediate consumption	906	978
Value added	283	307
Output	1 189	1 285

The value added for the illegal drug trade is R283 million (2011) and R307 million (2016). The intermediate consumption takes the amount of the manufacturing cost into consideration in Section 3, Table 5.13. This data is added under point 4 with all other illegal activities and informal wholesale and retail sector (point 3.2) to determine the total under-/underestimation of this sector. The following section describes the illegal trade in cigarettes

6.2.3.3.6 Illegal trade in cigarettes

Illegal manufacturing of tobacco is defined as the supply of smuggled or counterfeit tobacco products to avoid paying taxes[84] (Tobacco statistics 2016/2017 tax year). According to the Eurostat publication, (2018:38), the method to determine illegal manufacturing of tobacco is to use the volume involved. In this regard, the Tobacco Institute of Southern Africa (TISA) provides some data on the percentage of illegal production in South Africa. The price can be obtained from administrative data such as news articles or research work. In this case, with the lack of data, news articles are used to determine the price.

To determine the output of illegal cigarettes, the number of 20's packets of cigarettes is multiplied by the price of a packet of 20 cigarettes. To determine the intermediate consumptions, the price to manufacture a packet of 20's cigarettes is multiplied by the number of illegal packets of cigarettes. Value added is output minus intermediate consumption.

In 2011, the market for the illicit manufacturing of cigarettes equalled 8 280 million sticks (TISA, 2015); thus, 414 million packets of 20's cigarettes. There is a lack of 2016 data, and in order to determine figures for 2016, the average growth of illegal cigarette usage obtained from TISA data is used to determine illegal cigarette manufacturing for 2016. The average growth rate since 2011 is 3,2%. If the growth rate from 2011 to 2016 is taken into consideration, the number of illegal sticks manufactured amounts to 10 001 million sticks; 500 packets of 20's cigarettes.

According to TISA, the production costs (intermediate consumption) in 2011 for a packet of cigarettes (20) amounted to R3,77. This is supported by British American Tobacco SA (BATSA) that cites R3,80 per packet (20) of cigarettes. To determine the production cost of cigarettes per packet of 20' cigarettes in 2016, the average growth rate of illegal cigarette usage is taken into account, thus 3,2%. The cost of production for a packet of 20's cigarettes in 2016 amounted to R4,60.

In 2011, the selling price of a packet of cigarettes was R14,60.[85] This is supported when taking the taxes into consideration, which were R9,74 (2011) without any mark-up price. SA retail price of cigarettes ranges from 6% to 25% mark-up according to the Tobacco Control Legal Consortium's

[84] http://www.tobaccosa.co.za/illicit-trade/what-is-illicit-trade/
[85] http://pmg-assets.s3-website-eu-west-1.amazonaws.com/180502Treasury.pdf

minimum price laws on cigarettes.[86] To determine the 2016 illegal trade price of cigarettes, the price is based on the 2011 price with an annual growth rate of 3,2%, based on TISA data of illegal usage; this amounts to R17,09. The 2016 data can be well underestimated because "sin tax" between the period of 2011 and 2016 increased more than 3,2%.

To determine 2011 output, 414 (number of packets of 20's cigarettes) multiplied by the selling price of R14,60 equals R6 044 million. The intermediate consumption is 414 (number of packets of 20' cigarettes) multiplied by R3,80 (the cost to manufacture cigarettes), which equals R1 573 million. Output minus IC equals to value added (R4 471 million). The 2016 data is measured in the same manner.

Table 6.15: Measuring the value added of illegal trade in cigarettes for 2011 and 2016 (R' million)

Years	Number of 20's packets	Illegal selling price (per packet of cigarettes)	Cost of manufacture cigarettes (20's packet)	Output for cigarettes	Intermediate consumption	Value added
2011	414	14,60	3,80	6 044	1 573	4 471
2016	500	17,09	4,59	8 546	2 295	6 251

This table only reflects cigarettes and excludes all other tobacco products; thus, the likelihood does exist that the value added can be underestimated. The researcher decided to remain only with cigarettes.

6.2.3.3.7 Illegal trade in abalone

Unlawful trade in abalone is a very lucrative business, especially when exporting to other countries. The abalone harvest dropped dramatically since the 2000's with the introduction of quotas. However, the quota system has had a negative impact, because illegal trade in abalone increased dramatically. A further reason for illegal harvesting is the depreciation of the rand towards the euro, and illegal abalone becoming a very profitable business. According to data published by USAID, De Greef K. & Raemaekers S. (2014:1), *"South Africa's illicit abalone trade: An updated overview and knowledge gap analysis"*, illegal harvesting of abalone in 2013 was conservatively estimated at 1 723 tonnes, although in the last 10 years illegal harvesting amounted to 20 500 tonnes.

[86] http://www.publichealthlawcenter.org/sites/default/files/resources/tclc-guide-cigminimumpricelaws-2011.pdf

To determine the output of illegal abalone, the price is multiplied by the tonnes of abalone that were illegally harvested. According to De Greef K. & Raemaekers S. (2014:16), the black-market price of abalone from South Africa was USD40/kg in Port Elizabeth and USD30/kg in the Western Cape in 2012. These prices also differ when it comes to the size of the abalone. In the Western Cape, medium to large abalone fetches USD5/kg more. The researcher used the average price for abalone (thus USD35) and converted it to rand value. For the 2011 year, the growth rate between 2011 and 2012 of retail trade and wholesale trade is taken. The growth rate between 2011 and 2012 equals 4,2%; thus, the price per kg after conversion to rand equals R284,00/kg, and for 2016, after the conversion rate is taken into account, the price equals R377/kg.

The number of tonnes that is illegally harvested is also based on the growth rate, as only 2012 data is available. In 2011, illegally harvested abalone totalled 1 576 tonnes, and 2 062 tonnes in 2016. To obtain the total value of output, the tonnes are converted to kg. To determine the value for 2011, the price (R284,20) is multiplied by the kg harvested (1 567 000 kg), divided by R million; thus, R445 million of illegal abalone was harvested in 2011. To determine the 2016 value, the price (R479,85) is multiplied by the kg harvested (2 062 000 kg), divided by R million; thus, R989 millions of illegal abalone was harvested in 2016.

The intermediate consumption is determined as a percentage of IC: Output. In 2011, intermediate consumption equals 42% of output, and 43% in 2016. Value added is output minus IC.

Table 6.16: Measuring the value added of illegal trade in abalone (R' million)

Years	Output	Intermediate consumption	Value added
2011	445	187	258
2016	989	415	573

The table indicates that the illegal harvesting of abalone amounted to R573 million (2016). This is more than double the amount for 2011. The reason for this is the policy of government to issue licences for formal trade only, and not for small-scale fishermen. Small-scale fishermen turned to illegal fishing as poverty and unemployment increased.

6.2.3.3.8 Illegal trade in clothing and textiles

Because SARS is trying to protect local markets, illegal trade in clothing and textiles is prohibited. Currently, this sector is vulnerable by non-compliance regarding the valuation of the sector, and it therefore leads to the dumping of goods at lower prices in the market, which hampers growth in the domestic market. Data can be based on seizures made by customs in the case of illegal transactions (Eurostat: 46).

The methodology is to use SARS data to obtain the value of goods, and the Eurostat (2018) document to determine the value of goods. According to these international guidelines (Erostat: 48), in the case of goods in retail and wholesale services, the "rule of thumb" is used: fencers sell goods at a price of 40%–50% less than the actual price. The researcher's assumption is that 40% is used as the total value of stolen goods.

The output is measured by taking SARS data and converting this into the calendar year; thus, the value (output) of stolen goods amounts to R1 100 million for 2011 and to R9 million for 2016. The "rule of thumb" is that only 40% of this clothing is sold. Thus, R378 million for 2011 and R1 million for 2016.

Table 6.17: Measuring the value added of illegal trade in clothing and textiles for 2011 and 2016 (R' million)

Years	Output	Intermediate consumption	Value added
2011	378	0	378
2016	1	0	1

The table shows a dramatic decrease in the trade in illegal clothing and textiles. One possible reason can be more stringent control at the borders. Note that only customs data was taken into account; no local producers were taken into account. The likelihood does exist that these values are underestimated because part of these activities have not been covered.

6.2.3.3.9 Illegal trade in rhino horn

One of the sections on illegal trading that recently increased dramatically is the trade in rhino horn. The reason for trading in rhino horn is that it has become a very profitable business – so much so that

the price of rhino horn has surpassed the price of platinum and gold. In this chapter, the entire definition is not explained as it has already been mentioned in Chapter 4. (Agriculture sector).

To determine the output, the number of rhinos poached is multiplied by the price received for a rhino horn when it is traded on the black market. The number of poached rhinos was 448 for 2011 and 1 054 for 2016.

The prices obtained for rhino horn are based on articles, and the horn is measured in kg. According to PLOS (2016) by Haas TC & Ferreira SM, "*Combating rhino horn trafficking: the need to disrupt criminal networks*", the price of rhino horn is estimated to be between $35,000 and $60,000/kg. This price is supported by the Humane Society International UK (2011)[87] who indicates rhino horn prices as ranging from US$36,000 to US$83,000 per kilogram. For the purposes of this research, the researcher uses an average price of $59 500 (2016) and $47 500 (2011). The weight of a rhino horn is between 1,5 kg and 5 kg - the researcher used an average weight of 3.25 kg per rhino horn.

The price of rhino horns is converted to rand. To determine the price for 2011: $47000 multiply by R8,12 (convert US$ to Rands) multiply by 3,25/kg (average weight of rhino horns) equals to **R1 240 330**. To determine the price for 2016: $59 500 multiply by R13,71 (convert US$ to Rands) multiply by 3,25/kg (average weight of rhino horns) equals to **R2 651 171.**

To determine the IC for 2011, the cost to obtain are multiplied by the number of rhino horns. Intermediate consumption (IC) is determined by calculating the price the poacher asks to poach the horn and the costs incurred by the middleman to ship the horn. According to Haas TC & Ferreira S.M. (2016), the poacher who lives next to the park of hunting opportunity, has limited economic opportunities and is normally very poor; thus, they are paid approximately $1 750/kg of rhino horn. The next interim person is the middleman who needs to pay the air fees from Maputo in Mozambique to Asia, which amounts to $3 850/kg to ship the horn to Asia. IC for 2011 is determined by US$5600 multiplied by R8,12 multiplied by 3,25 (weight of the rhino horn), which equals to **R147 784**. The IC for 2016 is determined by using the same cost to obtain the horn (thus US$5600) multiplied by R13,71 multiplied by 3,25 (weight of the rhino horn), which equals to **R249 522**.

[87]http://www.hsi.org/issues/rhinoceros_poaching/facts/rhino_horn_trade.html

To determine 2011 output, 448 (number of rhino horns) is multiplied by R1 240 330 (price per horn) divided by a million, which equals R556 million. IC for 2011 is R147 784 (cost per horn) multiplied by 448 (number of rhino horns) divided by a million equals to R66 million. Value added is output (R556 million) minus IC (R66 million), which equals to the cost to obtain the rhino horn, R490 million.

To determine 2016 output, 1 054 (number of rhino horns) is multiplied by R2 651 171 (price per horn) divided by a million, which equals R2 794 million. IC for 2016 is R249 522 (cost per horn) multiplied by 1 054 (number of rhino horns) divided by a million equals to R262 million. Value added is output (R2 794 million) minus IC (R262 million), which equals to the cost to obtain the rhino horn, R2 532 million.

Table 6.18: Measuring the value added of illegal trade in rhino horn for 2011 and 2016 (R' million)

Years	Output	Intermediate consumption	Value added
2011	556	66	490
2016	2 794	262	2 532

The reason for the significant increase from 2011 to 2016 is the increase in rhino poaching in numbers. The researcher does not make any adjustment in price increases and indicates that the price is as given. No guidelines are given by Eurostat (2018) on how to measure this illegal activity; thus, the researcher assumes that all rhino horn is sold by poachers. The following activity is becoming a real problem in South Africa is cable theft.

6.2.3.3.10 Illegal trade in stolen cable

Cable theft is a very difficult illegal activity to determine, as few articles exist to explain the value of the losses suffered as a result of stolen cables. The value of losses does not only involve the cables that are stolen, but also the economic impact on businesses because of non-electricity supply to these businesses. Various news articles indicate that South Africa is losing billions in production because of cable theft, although little data is available and little research is done on the exact value of losses suffered as a result of cable theft.

According to Eurostat (2018:48), one of the characteristics of stolen goods is that these goods are sold at a price well below market price, leaving room for the fencer to make a profit as well, but it is also mentioned if demand is high, the fencer can pay the maximum price for goods; thus, between

40% and 50% of the items on retail value; the 40%–50% indicates the methodology of the "rule of thumb". As the retail value is not available because the type of cable and size of cable is unknown, the researcher makes the assumption to determine the output based on published news articles.

Limited data exists, which causes a problem when the output needs to be determined. Several articles indicate that an estimated loss due to copper theft amounts to around R5 000 million per annum.[88] In 2007, an article by Fin24 indicated that cable theft costed South Africa R5 000 million a year.[89] According to an article by Strydom E. (2016) on illegal trade, the economic impact with regard to cable theft amounts to R20 000 million per annum for South Africa. This includes theft of copper, dragline cables, electricity cables, etc. A further article in *Engineering News* (2011), "*Copper cable theft declared a high priority crime*"[90], states that copper theft amounted to R5 000 million per annum. This is seen as the output for 2011; thus, R5 000 million. When taking these articles into consideration, it is clear that this illegal activity is difficult to measure. The researcher makes the assumption that the R5 000 million is taken into account for output in 2011. To determine the 2016 output, the growth rate of the retail trade is taken into account. The output for 2016 is determined at being R6 526 million.

To determine the value added, an article in the *Pretoria News* is used. This article indicates that approximately R400 000 million of stolen cables is sold on the black market for R15 million; which can be seen as IC: Output. As no guideline is set out by Eurostat (2018) on how exactly to determine the output and value added, the above ratio is used. IC: Output ratio is 1:2,6. To determine the intermediate consumption, the IC for 2011 is R1 333 million and for 2016, it is R1 740 million.

Table 6.19: Measuring the value added of illegal trade in stolen cables for 2011 and 2016 (R' million)

Years	Output	Intermediate consumption	Value added
2011	5 000	1 000	4 000
2016	6 000	2 000	4 000

The table indicates that the value added for illegal trade in stolen cables is R4 million (2011) and R4 million (2016). However, this figure can be an underestimation, because no economic impact is

[88] https://www.google.co.za/search?q=value+of+cable+theft+in+south+africa&oq=value+of+cable+theft+in+south+africa&aqs=chrome..69i57.13503j0j7&sourceid=chrome&ie=UTF-8
[89] https://www.fin24.com/Business/Cable-theft-costs-SA-R5bnyr-20070808
[90] http://engineeringnews.co.za/print-version/copper-cable-theft-declared-a-high-priority-crime-2011-06-23

considered. The following section is a summary of the informal, illegal retail, wholesale trade and accommodation sector based on newly calculated data.

6.2.4 New estimations of the informal, illegal retail, wholesale trade and accommodation sector (SIC 6)

This section reflects two datasets – one for the reference period 2011 and the other for the reference period 2016. Table 6.20 indicates the value of total output, intermediate consumption and the value added separately, and includes the total sector (SIC 6) illegal activities and informal sector. This table includes all newly calculated estimates under point 3.

Table 6.20: Measuring total informal sector and illegal trading activities for 2011 and 2016

Years	Output	Intermediate consumption	Value added
2011	136 736	41 739	95 128
2016	219 591	65 326	154 262

When all the above values are taken into consideration, the likelihood still exists that the value added of this sector is underestimated. The main reason is that some illegal activities, such as illegal restaurants where alcohol is sold, are not considered. Informal accommodation is not considered. Some illegal activities such as trading in alcohol, illegal smuggling of people, firearms smuggling etc. are not considered. Note that many of these illegal activities are not reported to the police either. The next section evaluates the existing data against the new estimates of informal, own-account businesses and illegal services.

6.2.5 Evaluation of published data against newly calculated estimates for the wholesale trade and accommodation sector

The evaluation against the published data determines if the informal sector and non-observed economy are over-/underestimated. The two reference periods, namely 2011 and 2016, are shown separately.

To determine the over-/underestimation of NOE sector, as outlined in the objective statement, the newly calculated informal sector and NOE activities data in Table 6.20 for the specific reference year

are evaluated against the existing published data by Statistics South Africa, Release No. P0441, in the first table of this section column.

Table 6.21: Total informal sector and illegal activities for the reference period 2011 (R' million)

	Total published formal, informal, NOE of SIC 6	New estimation of formal, informal, NOE SIC 6 sector	Over-/underestimation of SIC 6
Intermediate consumption	17 523	41 739	-24 216
Total gross value added	78 359	95 062	-16 703
Total output at basic prices	95 881	136 802	-40 802

From the above table, it is clear that the value added for the period 2011 is underestimated by R16 769 million. This underestimation of the value added have an impact on the total economy GDP of a country, this result is further explained in chapter 7.

To determine the over-/underestimation of the informal sector and NOE activities for the calendar year 2016, the existing data by Statistics South Africa Release No. P0441 the second table of this section, column 3, is evaluated against the newly estimated wholesale-, retail-, hotel and restaurants sectors informal sector, small-scale sector and illegal activities.

Table 6.22: Total informal sector and illegal activities of SIC 6 reference period 2016 (R' million)

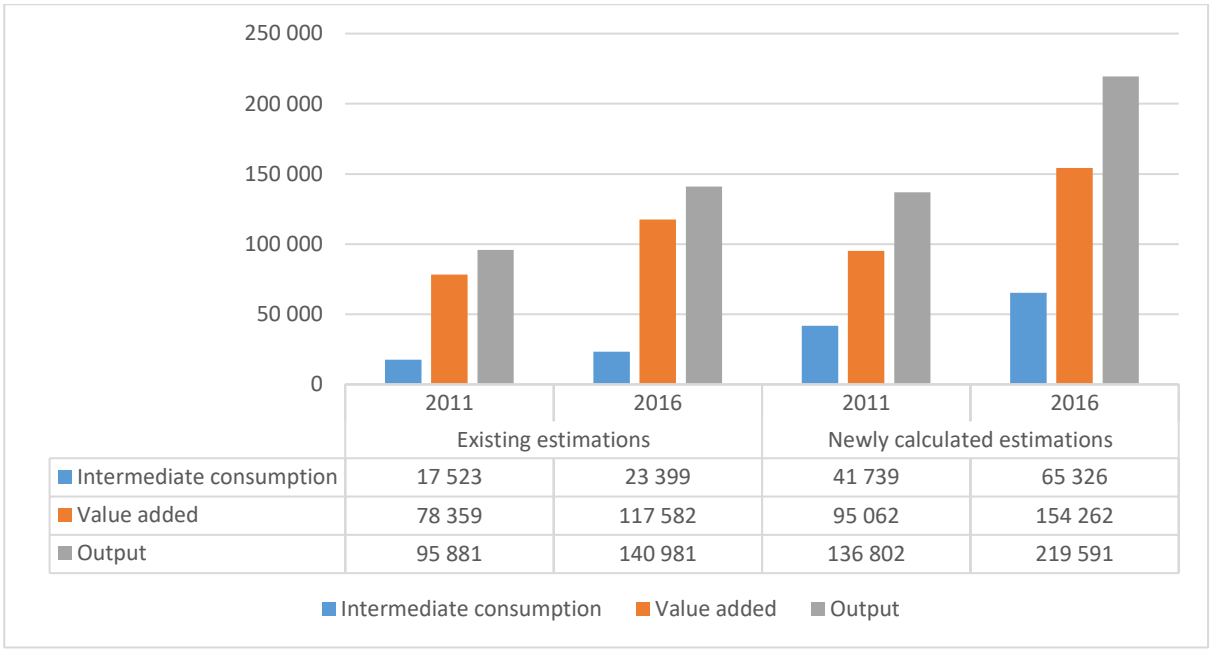
	Total published formal, informal, NOE activities	Current estimation of formal, informal, NOE activities	Over-/under-estimation of the wholesale trade and accommodation sector (SIC 6)
Intermediate consumption	23 399	65 326	-41 927
Total gross value added	117 582	154 262	-36 680
Total output at basic prices	140 981	219 591	-78 610

From the above table, it is clear that the value added for the period 2016 is underestimated by R36 680 million for SIC 6 value added; thus, it results in an underestimation of the total GDP. The results of both years indicate an underestimation of intermediate consumption, value added and output. These results are better conveyed as it is illustrated in a graph. The following section explains the reasons for the gap and the limitations.

6.2.6 Gap between existing published calculations and newly estimations of the wholesale trade and accommodation sector

The graph below evaluates the published data and the new estimates for the informal sector, own-account businesses and the non-observed economy, and indicates whether this sector is over-/ underestimated. The two reference periods, namely 2011 and 2016, are shown separately.

Graph 6.2: The gap between the newly NOE sector of SIC 6 compare to the current estimates of the NOE sector for the calendar year 2011 and 2016



	2011	2016	2011	2016
	Existing estimations		Newly calculated estimations	
Intermediate consumption	17 523	23 399	41 739	65 326
Value added	78 359	117 582	95 062	154 262
Output	95 881	140 981	136 802	219 591

The data in graph 6.2 indicates clearly that a gap exists between the current estimates and the new estimates for 2011. The value added is underestimated by R16 769 million, whereas for 2016, the value added is underestimated by R36 680 million.

When the above gap is taken into consideration, some limitations do exist, such as the lack of specific crime statistics by the SAPS (the exact value is also not mentioned, only the number of cases that are reported). Thus, if cases are not reported, these cases are not estimated under new illegal NOE activities. Petty thefts such as smash and grabs are not included. Furthermore, the absence of data pertaining to the value of goods such as illegal smuggling of alcohol, smuggling of drugs etc. (which data should be supplied by customs) and the fact that more often than not only the number of seizures is mentioned, requires that some assumptions need to be made. The lack of research on

specific crimes such as cable theft and human trafficking makes it difficult to estimate the exact size of NOE activities.

6.2.7 Concluding remarks with regard to the non-observed wholesale trade, retail trade, restaurants and accommodation sectors

Notwithstanding all the limitations in the data and the assumptions that are made in regards to administrative data, the research question to the size of the informal sector and illegal activities for the trade sector has been addressed, and the finding is that for the periods 2011 and 2016, the trade sector was underestimated. Furthermore, the research question if international guidelines were used to determine the NOE and informal, was addressed by using the SIC and Eurostat (2018) documentation. Using the above methodology, national accountants can use it to determine the informal and NOE activities closer.

The following section discusses the transport sector in respect of informal and illegal activities.

6.3 OVER OR UNDERESTIMATION OF TRANSPORT, POSTAL AND TELECOMMUNICATION SECTOR (SIC 7) OUTPUT

6.3.1 Introduction

In terms of the research problem formulated for the purposes of this study and the conceptual framework shown above, the question to answer is if the transport, postal and telecommunication sector total size is accounted for in the GDP. When all parameters such as formal activities, informal activities and NOE activities are considered, is the sector over- or underestimated? The estimates for the transport, postal and telecommunication sector for 2011 represented 9,4% of the total economy value added, and in 2016, it represented 9,7% of the total economy (Statistics South Africa, release No. P0441). The next matter is to ensure that all international guidelines are followed when measuring the informal sector, own-business sector and NOE activities. As mentioned in the objectives, the subsectors are not calculated and are only determined at one-digit level; thus, the entire transport, postal and telecommunication sector is added together for determining the size of the transport, postal and telecommunication sector.

6.3.2 Current estimation

In order to determine the current size of the transport, postal and telecommunication sector, the SIC is taken into account. According to the Standard Industrial Classification (SIC), the transport, postal and telecommunication sector includes all types of transport, postal and telecommunications such as land transport, transport, via pipelines, water transport, air transport, supporting and auxiliary transport activities, activities of travel agencies and postal and telecommunication. In order to measure the size of the transport, postal and telecommunication sector, the following equation is being applied:

SIC 7 = Transport, postal and telecommunication sector (Formal transport, postal and telecommunication sector + small-scale transport, postal and telecommunication sector + informal transport, postal and telecommunication sector + illegal transport, postal and telecommunication activities)

When considering the size of the transport, postal and telecommunication sector according to the above equation, the existing estimates for the transport, postal and telecommunication sector are obtained from two statistical releases.

The difference between the two tables is firstly, that the 10 x 10 use table is merely a condensed version of the 64 x 105 use table. Secondly, the 10 x 10 use table includes the informal sector, small-scale SIC 7 sector and illegal activities ***as part*** of the SIC 7 sector, whereas the 64 x 105 use table shows the informal sector, small-scale SIC 7 sector and illegal activities of all the sectors as ***one column*** in the statistical release. The assumption is made that the difference between the two tables by sector represents the informal sector, own accounts sector and illegal activities.

Before determining the estimates of the 2011 calendar year, the 64 x 105 use table needs to be condensed to reflect a 10 x 10 use table as well. This allows the researcher to determine the difference between the two tables, the 10 x 10 and 64 x 105, and therefore, to calculate informal transport, postal and telecommunication sector, small-scale transport, postal and telecommunication sector and transport, postal and telecommunication sector separately for each sector. A problem exists when comparing the two tables, 10 x 10 use table (published 2016) and – after condensing – the 64 x 105 use table (published 2014) to a 10 x 10 use table. It is notable that the two tables differ in IC, value added and output. The reason for this is that the 10 x 10 use table was revised in 2016, although it is not mentioned which sector was revised. To accommodate for this revision of the 10 x 10 use table (2016) intermediate consumption, value added and output, the 64 x 105 use table (2014) is revised and compressed to a 10 x 10 use table. The assumption is made that the revision is added to the informal transport, postal and telecommunication sector, illegal transport, postal and telecommunication sector and own account transport, postal and telecommunication sector.

The second step is to determine the difference between the tables. This represents the informal transport, postal and telecommunication sector, the illegal transport, postal and telecommunication sector, and the own-account transport, postal and telecommunication sector. This difference being that the revised 10 x 10 use table published P0441 GDP 1st quarter (2016) value added is R257 335 million, whereas the 64 x 105 use table, when condensed to a 10 x 10 table, value added is R239 047 million, which then is equal to a revised amount of R18 288 million. This amount reflects the current estimations for the 2011 informal transport, postal and telecommunication sector, the illegal

transport, postal and telecommunication sector, and the own-account transport, postal and telecommunication sector.

Table 6.23: Informal transport, postal and telecommunication sector, illegal transport, postal and telecommunication sector and own-account transport, postal and telecommunication sector for 2011 (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Supply and use table 64 x 105 published P0441 GDP 4th quarter 2014	Difference between two tables reflects the revision portion NOE sector allocated to transport, postal and telecommunication sector
Intermediate consumption	268 965	257 960	11 005
Total gross value added	257 335	239 047	18 288
Total output at basic prices	526 299	497 006	29 293

Source: Statistics South Africa (release No. P0441, 4th quarter 2014)

Table 6.23 measures the IC, value added and output after revisions in 2016 affected the 10 x 10 use table; this is seen as the published NOE sector allocated to the transport, postal and telecommunication sector. This is evaluated under point 5 against the new estimates of the informal, small-scale and NOE activities allocated to the transport, postal and telecommunication sector; this represents the over-/underestimation of the 2011-year value added.

The following section determines 2016 informal transport, postal and telecommunication, small-scale transport, postal and telecommunication and NOE transport, postal and telecommunication activities of IC, value added and output. A Release by Statistics South Africa is taken into account, namely Release No. P0441, "*Gross domestic product (GDP) 4th quarter 2017*", annual, quarterly and regional fourth quarter 2017.xls tables are used, worksheet "SUT 2016"; this represents a 10 x 10 use table and worksheet "use table 2016 (64 x 105)" that represents the larger use table. The 2016 data is not revised; thus, the two releases are used as is. The 64 x 105 use table is just condensed to a 10 x 10 use table. Determining the two 10 x 10 use table's differences it represent the portion that is allocated to SIC 7 informal sectors, own account sector and NOE activities sector, see table below.

Table 6.24: Transport, postal and telecommunication informal sector, small-scale sector and illegal sector for 2016 (R' million)

	Use table 10 x 10 published P0441 GDP 1st quarter 2016	Supply and use table 64 x 105 condensed to 10 x 10 use table	Difference between two tables reflects the transport, postal and telecommunication NOE sector
Intermediate consumption	405 651	385 873	19 778
Total gross value added	384 503	347 156	37 347
Total output at basic prices	790 154	733 029	57 125

Source: Statistics South Africa (release No. P0441, 4th quarter 2017)

Table 6.24 represents the 2016 data that is allocated to the informal transport, postal and telecommunication sector, small-scale transport, postal and telecommunication sector and illegal transport, postal and telecommunication activities. This current SIC 7 sector calculations for informal, small and NOE activities IC, value added and output (column 3) data is compared under point 5 with the new estimates of the informal transport, postal and telecommunication sector, small-scale transport, postal and telecommunication sector and illegal transport, postal and telecommunication activities for 2016.

The following section represents the new calculation of the informal transport, postal and telecommunication sector, small-scale transport, postal and telecommunication sector and illegal transport, postal and telecommunication activities for the reference years 2011 and 2016.

6.3.3 New estimation of informal and illegal transport, postal and telecommunication sector informal and illegal activities (SIC 7)

This section consists of the informal and own-account transport, postal and telecommunication and sector is calculated to compare with the above current estimations.

6.3.3.1 Informal transport, postal and telecommunication sector

In an article by Barrett J. "A Case Study of the Minibus Taxi Sector in South Africa", the taxi sector is defined as an informal sector activity, since the majority of the taxi sector has the characteristics of the informal sector as mentioned in Chapter 2. Note that the informal sector is defined in terms of the characteristics of the enterprise where the activity takes place, and not in terms of the person that is involved or the kind of jobs that are involved. The informal sector is also defined as a subset of a

household unincorporated enterprise, and the word "enterprise" is a very broad term and includes not only hired labour but also businesses operated by an owner or by a single operator (OECD 2002:162-163).

The Postal and telecommunication sector has almost no informal activities except the small-scale businesses that provide a service. For example, to borrow the landline for a call or fax at an additional fee. This kind of data is unknown and is not measured under this section. To measure the informal transport, postal and telecommunication sector, two published documents are used to establish the output, IC and value added. The publications are the Statistics South Africa publication (2018:56), Release No. P0211, *Quarterly labour force survey*, Table 3, and the Statistics South Africa Release No. P0277, *Quarterly employment statistics*, Table G.

Sic 7 informal sector 2011 calendar year – The Statistics South Africa publication (2018:56), Release No. P0211, *Quarterly labour force survey*, Table 3 and Statistics South Africa Release No. P0277, *Quarterly employment statistics*, Table G, are both quarterly releases; thus, the average number of employees and the average salary over a period of four quarters are used. Thus, the output for 2011 is 204 000 (average number of employees) multiplied by R14 735 (average monthly earnings) multiplied by 12 (to obtain annual salary) divided by R million (obtaining data in millions), which equals R36 037. The IC is calculated by using the ratio of the IC (informal and NOE activity sector) towards the output of the informal and NOE activity sector for the year 2011. To determine informal transport, postal and telecommunication sector, the ratio of IC (R116 585) to output (R335 804) is used, which is 34,7%. Thus, IC 34,7% of output and equals R34 124. Value added is output (R36 037) minus IC (R12 505), which equals R23 532.

Informal sector for the 2016 calendar year- based on Statistics South Africa publications the output for 2016 is 240 523 (average number of employees) multiplied by R20 422 (average monthly earnings) multiplied by 12 (to obtain annual salary) divided by R' million equals R245 064. The IC is calculated by using the same ratio of the IC (informal and NOE activity sector) towards the output of the informal and NOE activity sector for the year 2016. To determine the IC for SIC 7, the ratio of IC to output is used, this is 35% (the ratio is based on the 64_105 table in release no P0441); thus IC 35% of output equals to R20 630. Value added is output (R58 944) minus IC (R20 630) equals to R38 313.

Table 6.25: Measuring value added of informal transport, postal and telecommunication sector for 2011 and 2016 years (R' million)

	2011	2016
Intermediate consumption	12 505	20 630
Value added	23 532	38 313
Total output at basic prices	36 037	58 944

The value added in 2011 by the informal transport equals R23 532 and R38 313 for 2016. These calculations only reflect data pertaining to the taxis. The calculation excludes the small-scale operator that informally picks up people in the street to cover his/her cost for travelling.

6.3.3.2 Own account transport, postal and telecommunication sector

Own-account informal transport, postal and telecommunication is defined as trading by the owner to obtain an income for him-/herself. Own-account workers are non-VAT registered businesses that are small in nature, sometimes with no employees or fewer than five employees. The methodology in use is analytical in nature and the current publication of Statistics South Africa. Statistical South Africa survey (2013), Released No. P0276, "*Survey of Employees and self-Employed"(SESE),* table 18 is used. In this research on informal transport, postal and telecommunication, own-account is calculated by using the above mentioned release. The net profit data is used for own-account workers.

According to the release SESE table 18 (table 19 on request), the last calendar month self-employed owner had a net profit of R4 243 million (2013). The last calendar month means the month prior to when the survey was conducted. To determine the annual profit, the monthly profit is multiplied by 12. The disadvantage of this publication is that is a four-yearly publication, and consequently the publication dealt with 2009, and the next publication in 2013.

To determine the output for the 2011 and 2016 calendar years, the average growth rate of the transport, postal and telecommunication, based on the release by Statistics South Africa (2016) No. P0441, "*Gross Domestic Product (GDP), 4th quarter*, is used. Using the growth rates between the years, the amount of own-account transport, postal and telecommunication is R2 842 (2011) and R4 957 (2016).

IC has not been calculated as net profit is measured and value added is output minus IC.

Table 6.26: Measuring value added of own-account transport, postal and telecommunication sector for the years 2011 and 2016 (R' million)

	2011	2016
Intermediate consumption	0	0
Value added	2 842	4 957
Total output at basic prices	2 842	4 957

Source: Statistics South Africa release: P0276

Between 2011 and 2016, the table indicates that the own-account taxi sector almost doubled in size. The main reason for this is a fast-growing population that needs regular transportation and the decline in reliable public transport provided by national and local governments. This is supported by Sauti G. (2006), who indicates that 65% of South African commuters make use of taxis as their preferred mode of travel. Beyond own-account and informal travelling, all unlicensed and un-roadworthy vehicles on the roads are seen as illegal transport of goods and services on the road. Transportation of goods and services includes illegal buses, motorcycles, LDVs bakkies, trucks, other, minibuses and motorcars, caravans, heavy trailers and light trailers on the roads.

6.3.3.3 Illegal transport sector

The 2008 SNA:48 indicates that illegal transactions should be treated the same way as legal transactions, as these are a mutual agreement between parties to trade products or deliver a service. Illegal transportation with regard to providing a service is the transportation of goods and services in unlicensed and un-roadworthy vehicles. In this case, the commuters are not aware but the owners and drivers are aware of the illegal transportation. In the case of transporting goods, the owners know about unlicensed and un-roadworthy vehicles, but sometimes the driver is unaware. The postal and telecommunication sector is not discussed, as this is a regulated activity and little data is available.

The methodology in use is an analytic study, as published data by the DOT and administrative data published by BusinessTech is used for analytical purposes. To determine the output of illegal vehicles, only taxis is taken into account, no other transport is taken into account. The number of vehicles (DOT data) are multiplied by the price average income received by a taxi per annum. IC is determined by taking the percentage of IC towards output as mentioned under part 2, current estimates, this is

supported by BusinessTech data. Determining the IC includes salaries paid, petrol, tyres and lubricants.

According to an article of businesstech (2017)", "*How much taxi drivers earn in South Africa*", approximately 200 000 minibus taxis earn about R90 000 million ("R90 billion") per annum. Taking the article into consideration, the amount that a taxi owner earns is approximately R450 000 (2017). Furthermore, this article indicates that it is uncertain how much the illegal taxi sector amounted for as the taxis sector are mostly unregulated. Determining the illegal transportation of commuters, the researcher makes the following assumptions in determining the value added for 2011 and 2016.

The first assumption is that unlicensed and un-roadworthy vehicles on the road are seen as illegal transportation of commuters. The number of unlicensed and un-roadworthy taxis on the road is obtained from the department of transport (DOT). The second assumption is that the illegal taxi owner earns the same as the legal taxi owners, thus R450 000 per annum. Determining the value added the IC needs to be measured. Measuring the IC, the ratio between IC to output reflects under part 2, current estimations are used. The 2011 IC represents 37,5% of output whereas 2016 represents 34,7% of output. These percentages of IC are supported by an article published in BusinessTech[91] which indicates that expenses on taxes can be from 30% to 50%.

The output for 2011 is calculated by the number of unlicensed/un-roadworthy vehicles, namely 4525. This number is multiplied by income earned during the year. The income earned amounted to R450 000 per annum. The calculated amount is divided by a million to determine amount in millions. This amounted to R2 039 million in 2011. IC (R11 005 million) to output (R29 293 million) represented 37,5% (2011). The IC is determined by R2 036 multiplied by 37,5% which equal to R763 million. Value added is output (R2 036 million) minus IC (R763 million) which equals R1 273 million.

The output for 2016 is calculated by the number of unlicensed / un-roadworthy vehicles, namely 4718 times the income earned during the year. The income during the year amounted to R450 000. The calculated amount is divided by a million to determine amount in millions. This amount to R2 123 million for 2016. IC represent 34,7% of the output thus R736 million. Value added is output (R2 123

[91] https://businesstech.co.za/news/motoring/209157/how-much-taxi-drivers-earn-in-south-africa/

million) minus IC (R736 million) equals R1 387 million. The value added on illegal transport is reflected in the following table.

Table 6.27: Measuring value added illegal sector of transport for the years 2011 and 2016 (R' million)

	2011	2016
Intermediate consumption	763	736
Value added	1 273	1 387
Total output at basic prices	2 036	2 123

In analysing the value added between the two years, the increase is not significant. The researcher is cautious to make more assumption. It must be kept in mind that this amount of value added can be underestimated, as not all illegal transportation of goods and service providers are measured e.g. trucks busses, trailers etc.

The following discussion focusses on the evaluation of the current estimates and the newly informal and NOE activities of transport, postal and telecommunication.

6.3.4 New estimations of informal and illegal activities of the transport, postal and telecommunication (SIC 7) sector

This section reflects two datasets – one for the reference period 2011 and the other for the reference period 2016. Table 6.28 indicates the value of total output, intermediate consumption and value added separately, and indicates the total sector (SIC 7) illegal activities and informal sector. This table includes all newly calculated estimates under point 3.

Table 6.28: Measuring total value added of NOE sector for transport, postal and telecommunication sector for 2011 and 2016 (R' million)

	2011	2016
Intermediate consumption	13 268	21 366
Value added	27 647	44 657
Total output at basic prices	40 915	66 024

When taking the above table into consideration, the likelihood may exist that the value added of this sector is underestimated because, as mentioned above, some vehicles/trailers are still excluded when measuring the value added of illegal transportation.

6.3.5 Evaluation of published data against newly calculated estimates for the transport, postal and telecommunication sector

The evaluation against the published data determines if the informal sector and non-observed economy were over-/underestimated. The two reference periods, namely 2011 and 2016, are shown separately.

To determine the over-/underestimation of the informal sector and NOE activities, as outlined in the objective statement, the newly calculated informal sector and NOE activities data in Table 6.28 for the specific reference year is evaluated against the existing published data by Statistics South Africa, Release No. P0441, as stipulated in the first table of this section.

Table 6.29: Total informal sector and illegal activities value added for the reference period 2011 (R' million)

	Total published NOE sector of SIC 7	New estimation of NOE SIC 7 sector	Over-/underestimation of SIC 7
Intermediate consumption	11 005	13 268	-2 263
Total gross value added	18 288	27 647	-9 359
Total output at basic prices	29 293	40 915	-11 622

From the above table, it is clear that the value added for the period 2011 is underestimated by R9 359 million. This underestimation of the value added has an impact on the total economy GDP of a country, this result is further explained in Chapter 7.

To determine the over-/underestimation of the informal sector and NOE activities for the calendar year 2016, the existing data by Statistics South Africa Release No. P0441, the second table of this section, column 3, is evaluated against the newly estimated transport, postal and telecommunication informal sector, small-scale sector and illegal activities. Table 6.30 reflect calculations for calendar year 2016.

Table 6.30: Total informal sector and illegal activities value added of SIC 7 reference period 2016 (R' million)

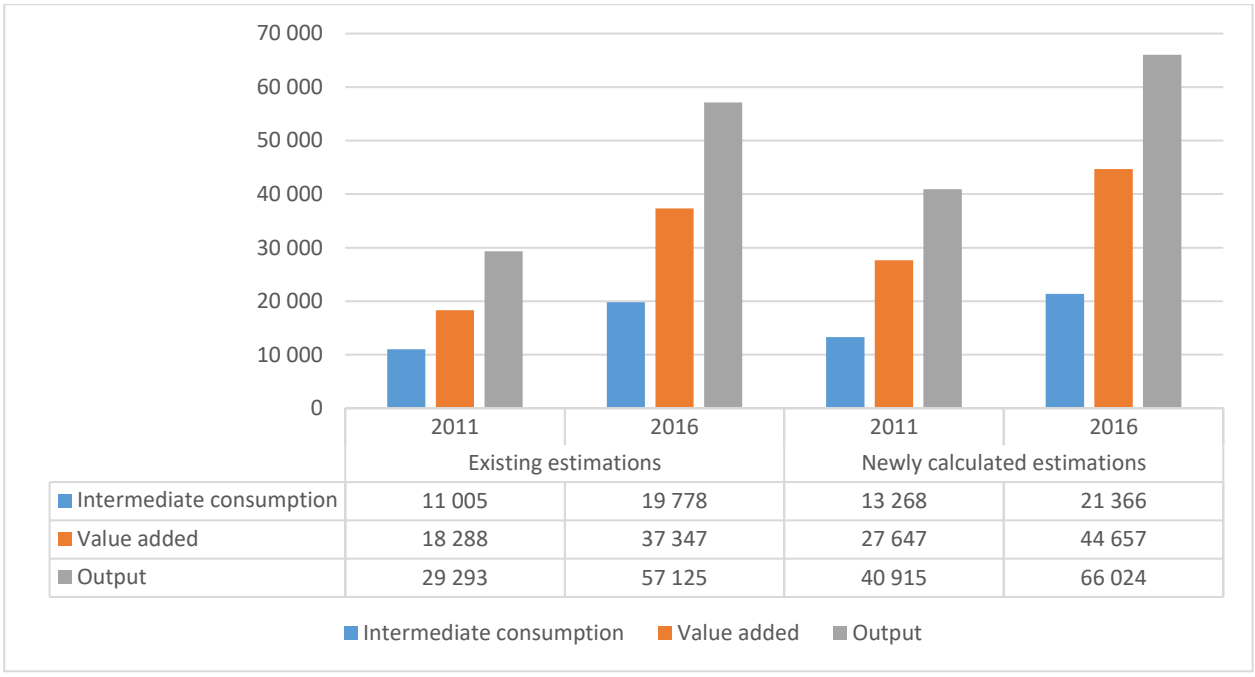
	Total published NOE sector	Current estimation of NOE sector	Over-/under-estimation of the transport, postal and communication sector (SIC 7)
Intermediate consumption	19 778	21 366	-1 588
Total gross value added	37 347	44 657	-7 310
Total output at basic prices	57 125	66 024	-8 899

From the above table, it is clear that the value added for the period 2016 is underestimated by R7 310 million for SIC 7 value added; thus, it results in an underestimation of the total GDP. The results of both years indicate an underestimation of intermediate consumption, value added and output. These results are better conveyed as it is illustrated in a graph. The following section explains the reasons for the gap and the limitations.

6.3.6 Gap between existing published calculations and newly estimations for the transport, postal and telecommunication sector

The graph evaluates the published data and new estimates for the informal sector, own-business accounts and non-observed economy and indicates whether this sector is over-/underestimated. The two reference periods, namely 2011 and 2016, are shown separately.

Graph 6.3: The gap between the newly NOE sector of SIC 7 compare to the current estimates of the NOE sector for the calendar year 2011 and 2016



	2011	2016	2011	2016
	Existing estimations		Newly calculated estimations	
Intermediate consumption	11 005	19 778	13 268	21 366
Value added	18 288	37 347	27 647	44 657
Output	29 293	57 125	40 915	66 024

This graph indicates clearly that a gap exists between the current estimates and the newly calculated estimates for 2011. The value added is underestimated by R9 359 and the 2016 value added is underestimated by R7 310 million.

Taking the above gap into consideration, some limitations do exist with regard to the exact number of illegal vehicles on the road, the type and value of vehicles. If this data is available on an administrative level, the exact value of illegal transportation can be measured. Illegal postal and communication services lack data and it leads to an underestimation of this sector. Furthermore, the OECD (2002) and Eurostat (2018) international guidelines do not have a specific methodology on how to determine the illegal transportation, postal and communication sector, thus the assumption is made by the researcher that it is country-specific.

6.3.7 Concluding remarks with regard to the transport, postal and telecommunication sector

Notwithstanding all the limitations in the data and assumptions that are made, the research question with regard to the size of the informal sector and illegal activities for SIC 7 has been addressed, and the finding is that for the periods 2011 and 2016, the transport, postal and telecommunication sector for 2011 and 2016 was underestimated. Secondly, measurement for informal own-account and NOE

activities for SIC 7 is in line with the international guidelines and it can be used by national accountants to measure this sector. Taking this into consideration, the objectives of this sector was met.

The following section discusses the financial intermediation, insurance, real estate and business services (SIC 8).

6.4 OVER OR UNDERESTIMATION OF THE FINANCIAL INTERMEDIATION, INSURANCE, REAL ESTATE SECTOR (SIC 8)

6.4.1 Introduction

In terms of the research problem formulated for the purposes of this study and the conceptual framework shown above, the question to answer is if the financial, intermediation, insurance and real estate sector total size is accounted for in the GDP. Is the sector over- or underestimated when one considers the parameters such as unavailability of illegal data, assumptions and administrative data when measuring the informal sector, small-scale SIC 8 and NOE activities. The objective of the research of the SIC 8 sector is to determine the size of the SIC 8 sector on one-digit level, not subsectors, with regard to the NOE sector. This sector should be measured with caution as SIC 8 is the largest contributor of the GDP.

This section consists of the current estimations, followed by the new estimations, the total measurements of the illegal and informal activities and lastly, the conclusion and limitations encountered.

6.4.2 Current estimation

In order to determine the current size of the SIC 8 sector, the Standard Industrial Classification (SIC) is considered. According to the SIC, the SIC 8 sector comprises all the financial, intermediation, insurance, real estate and business services sectors. All of these sectors are measured to ensure that the total size of the SIC 8 sector is accounted for. In order to measure the size of the SIC 8 sector, the following equation was applied:

SIC 8 = Financial, intermediation, insurance, real estate and business services sectors (Formal financial, intermediation, insurance, real estate and business services sector + small-scale financial, intermediation, insurance, real estate and business services sector sector/informal SIC 8 sectors + illegal financial, intermediation, insurance, real estate and business services sector sector)

When considering the size of SIC 8 sector according to the above equation, the existing estimates for SIC 8 are obtained from two statistical releases. Firstly, Statistics South Africa Release No. P0441, "*Gross domestic product (GDP) 1st quarter 2016*", the table in use is GDP annual and regional Table 2016, worksheet "SUT 2011"; this represents a 10 x 10 supply and use table. Secondly, Statistics South

Africa Release No. P0441, "*Gross domestic product (GDP)" 4th quarter 2014*", the table in use is Tables 4th quarter 2014.xls, worksheet "Use table 2011"; this represents a 64 x 105 supply and use table.

The difference between the two tables is firstly, that the 10 x 10 use table is merely a condensed version of the 64 x 105 use table. Secondly, the 10 x 10 use table includes the informal sector, small-scale SIC 8 sector and illegal activities ***as part*** of the SIC 8 sector, whereas the 64 x 105 use table shows the informal sector, small-scale SIC sector and illegal activities of all the sectors as ***one column*** in the statistical release. The assumption is made that the difference between the two tables by sector represents the informal sector, own accounts sector and illegal activities.

Before determining the estimates of the 2011 calendar year, the 64 x 105 use table needs to be condensed to reflect a 10 x 10 use table as well. This allows the researcher to determine the difference between the two tables, the 10 x 10 and 64 x 105, and therefore, to calculate informal SIC 8, small-scale SIC 8 sector and illegal SIC 8 activities separately for each sector. A problem exists when comparing the two tables, 10 x 10 use table (published 2016) and – after condensing – the 64 x 105 use table (published 2014) to a 10 x 10 use table. It is notable that the two tables differ in IC, value added and output. The reason for this is that the 10 x 10 use table was revised in 2016, although it is not mentioned which sector was revised. To accommodate for this revision of the 10 x 10 use table (2016) intermediate consumption, value added and output, the 64 x 105 use table (2014) is revised and compressed to a 10 x 10 use table. The assumption is made that the revision is added to the informal SIC 8 sector, illegal SIC 8 sector and own account SIC 8 sector.

The second step is to determine the difference between the tables. This represents the informal SIC 8 sector, the illegal financial, intermediation, insurance, real estate and business services sectors, and the own-account financial, intermediation, insurance, real estate and business services sectors. This difference being that the revised 10 x 10 use table published P0441 GDP 1st quarter (2016) value added is R566 117 million, whereas the 64 x 105 use table, when condensed to a 10 x 10 table, value added is R541 708 million, which then is equal to a revised amount of R24 409 million. This amount reflects the current estimations for the 2011 informal financial, intermediation, insurance, real estate and business services sectors, the illegal financial, intermediation, insurance, real estate and business services sectors, and the own-account financial, intermediation, insurance, real estate and business services sectors.

Table 6.31: Informal SIC 8 sector, informal sector, own-account and illegal activities for 2011 year (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Translated 64 x 105 to condensed in 10 x 10 use table (2014)	SIC 8 informal, small-scale and illegal sector
Intermediate consumption	495 187	465 794	29 393
Total gross value added	566 117	541 708	24 409
Total output at basic prices	1 061 304	1 007 502	53 802

Source: Statistics South Africa (release No. P0441, 4th quarter 2014)

The above table reflects the portion that is allocated to the financial, intermediation, insurance, real estate and business services informal sectors, own-account sector and illegal sector. Thus, IC is calculated by subtracting the figures in the 2014 condensed 10 x 10 table from the figures in the revised 2016 use table. The IC for 2011 is therefore R29 393 million and output reflects a value of R53 802 million. This current IC, value added and output data for the SIC 8 informal, small-scale and NOE activities are compared with the new estimates for 2011 under point 5.

The following section determines the 2016 SIC 8 informal, small-scale and illegal activities IC, value added and output. A release by Statistics South Africa is taken into account, namely Release No. P0441, "*Gross domestic product (GDP) 4th quarter 2017*", annual, quarterly and regional fourth quarter 2017.xls tables are used, worksheet *"SUT 2016*". This represents a 10 x 10 use table and worksheet "use table 2016 (64_105)" that represents the larger use table. The 2016 data is not revised; thus, the two releases are used as is. The 64 x 105 use table is condensed to a 10 x 10 use table. Determining the two 10 x 10 use table's differences it indicates the portion that is allocated to the financial, intermediation, insurance, real estate and business services informal sectors, own-account sector and NOE activities sector. See table below.

Table 6.32: Informal SIC 8 sector, informal sector, own-account and illegal activities for 2016 year (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Translated 64 x 105 to condensed in 10 x 10 use table (2014)	SIC 8 NOE sector
Intermediate consumption	758 988	720 368	38 620
Total gross value added	784 065	750 496	33 569
Total output at basic prices	1 543 053	1 470 865	72 188

Source: Statistics South Africa (release No. P0441, 4th quarter 2017)

This table represents the 2016 data that is allocated to the SIC 8 informal sector, small-scale sector and illegal activities. This current informal, small-scale and NOE activities IC (R38 620 million), value added (R33 569 million) and output (R72 188 million) data is compared under point 7 with the new estimates of the SIC 8 informal sector, small-scale sector and the illegal activities for 2016.

The following section represents the new calculations of the SIC 8 informal sector, small-scale sector and the illegal activities for the reference years 2011 and 2016.

6.4.3 New calculations of the financial, intermediation, insurance, real estate and business services sector for informal, own-account and illegal activities (SIC 8)

Informal financial services comprise of all services rendered for an income. The examples of such financial services are discussed under the informal sector. The second section consists of own-account or self-employed financial business services. The last item under this heading is the illegal financial services; however, calculations for this item are more problematic, because only limited data is available.

6.4.3.1 Informal financial, intermediation, insurance, real estate and business services sector

The OECD (2002:167) indicates that in the past, enterprises engaged in technical and professional services were excluded from the production process, but the 15th ICLS recommended that these entities should have no special treatment and be included in the production process. When taking the SIC classification into consideration, the informal sector includes services such as bookkeepers, consulting engineers, data processing services, architects, quality surveyors, land surveyors, geological and prospecting services, non-registered architects, advertising agents, debt collecting services, detective agencies hiring out of labour, etc.

In order to measure the SIC 8 informal financial, intermediation, insurance, real estate and business services sector, a quantitative study approach is applied because published data is being analysed. The two releases that serve as the basis for this measurement are both published by Statistics South Africa, namely Release No. P0211, "*Quarterly labour force survey"*, Table 3.3, which will assist in determining the number of employees working in the informal SIC 8 sector, and Release No. P0277, "*Quarterly employment statistics*," Table G, which is used to obtain data pertaining to the annual

salary earned by employees working in the informal SIC 8 sector. This release is used to determine three variables namely, the IC, value added and output of SIC 8.

To determine the output, IC and value added for the 2011-year, output is calculated by the number of employees multiplied by the average salaries received per annum divided by a million to obtain the earnings of informal employees. The number of employees is obtained from the Statistics South Africa publication (2018:56), Release No. P0211, "*Quarterly labour force survey"*, Table 3.3. As this publication is a quarterly publication, the average number of employees is taken over a period of the four quarters. The average salary of the employees of the specific reference year is obtained from Statistics South Africa Release No. P0277, "*Quarterly employment statistics"*, Table G. The salary is calculated by ascertaining the average salaries for the four quarters. The output for 2011 is 149 605 (average number of employees) multiplied by R12 994 (average monthly earnings), multiplied by 12 (to obtain annual salary), divided by R million, which equals R45 557. The IC is calculated by using the same ratio of the IC (informal and NOE activity sector) toward output which was obtained from the 64 x 105 table in Release P0441 (Statistics South Africa). In order to determine the IC for SIC 8, the ratio of IC to output is used, which in this case is 34,7%. Thus, IC is 34,7% of R8 095 million, which equals R23 328 million. Value added is output (R23 328 million) minus IC (R8 095 million), which equals R15 233 million.

To determine the output, IC and value added for 2016, output is calculated by the number of employees multiplied by the average salaries received per annum divided by a million to obtain earnings of informal employees. The number of employees is obtained from the Statistics South Africa publication (2018:56), Release No. P0211, "*Quarterly labour force survey"*, Table 3.3. As this publication is a quarterly publication, the average number of employees over a period of four quarters is ascertained. The average salary of the employees of the specific reference year is obtained from Statistics South Africa, Release No. P0277, "*Quarterly employment statistics"*, Table G. The salary is calculated by ascertaining the average salaries over a period of four quarters. The output for 2016 is 208 358 (average number of employees), multiplied by R18 221 (average monthly earnings), multiplied by 12 (to obtain annual salary), divided by a million, which equals R45 558. The IC is calculated by using the same ratio of the IC (informal and NOE activity sector) towards the output of the informal and NOE activity sector that is reflected in table 6.31. To determine the IC for SIC 8, the ratio of IC to output is used, which is 35,0%. Thus, IC is 35,0% of R45 558 million, which equals R15 945

million. Value added is output (R45 558 million) minus IC (R15 945 million), which equals R29 613 million.

Table 6.33: Measuring value added of the informal financial, intermediation, insurance, real estate and business services sector for 2011 and 2016 (R' million)

	2011	2016
Intermediate consumption	8 095	15 945
Value added	15 233	29 613
Total output at basic prices	23 328	45 558

Source: Statistics South Africa release No. P0441 4th quarter 2014 (2011) and No. P0441 4th quarter 2017(2016)

Table 6.33 shows that the total SIC 8 informal sectors for the period 2011 to 2016 reflect a value added of R15 233 million (2011) and R29 613 million (2016) respectively. The data for 2011 is in line with the data reflected in Table 6.31, but in Table 6.33, the informal data still excludes data pertaining to illegal and self-employed services.

The following point (3.2), unpacks the methodology of how to calculate the value added of the self-employed financial, intermediation, insurance, real estate and business services sector.

6.4.3.2 Self-employed financial, intermediation, insurance, real estate and business services sector

The self-employed financial, intermediation, insurance, real estate and business services sector comprises small-business owners who normally work from their own premises, and this sector adopts the characteristics of own-account workers, mentioned in Chapter 2. According to Statistics South Africa publication (2013), release No. P0276, "*Survey of Employers and the Self-Employed*" (SESE), Table 18, own account workers are non-VAT registered businesses that are small in nature, with no employees or fewer than five employees. In this research of SIC 8 own-account/self-employed workers, value added is calculated by using data provided in the aforementioned release. The net profit data is used for own-account workers to measure the value added of financial, intermediation, insurance, real estate and business services sector.

According to this release (Table 18, not formally published but can be obtained), the last calendar moth shown that own-account workers recorded a net profit of R9 066 million (2013). The last calendar month means the month prior to when the survey was conducted. To determine the annual profit, the monthly profit is multiplied by 12.

The disadvantage of this publication is that it is a four-yearly publication; thus, the publication is for 2009 and the next publication covers 2013. To determine the data for 2011 and 2016, the year-on-year growth rate of the SIC 8 sector, based on release No. P0441 by Statistics South Africa, is used. In order to determine the 2011 data for SIC 8 own-account workers, the year-on-year growth rate is calculated backwards using 2013 as the base year. The data for 2011 is therefore calculated as being R6 232 million for own-account workers. To determine the data for SIC 8 own-account workers for 2016, based on the year-on-year growth rate of SIC 8, release P0441 (Statistics South Africa), the amount is calculated as R10 848 million. These amounts are seen as output and value added as net profit is used.

Table 6.34: Measuring value added of self-employed financial, intermediation, insurance, real estate and business services sector (R' million)

	2011	2016
Intermediate consumption	0	0
Value added	6 232	10 848
Total output at basic prices	6 232	10 848

Source: Statistics South Africa release: P0276

The table above not only includes financial services, but also includes other services as indicated in the informal sector - such as bookkeepers, consulting engineers, data processing services, architects, quality surveyors, land surveyors, geological and prospecting services, non-registered architects, advertising agents, debt collecting services, detective agencies, hiring out of labour, etc., who are working for themselves.

The following point under discussion is the illegal activities of SIC 8.

6.4.3.3 Illegal activities in the financial, intermediation, insurance, real estate and business services sector

According to Eurostat (2018) and OECD (2002:156), illegal activities in this sector include bribery, corruption, illegal gambling, money laundering, fraud, and swindling. These activities can also be regarded as commercial crime. This discussion will include some of these activities where availability of data exits.

6.4.3.3.1 Commercial crimes/money laundering

The OECD (2002:155) defines money laundering as money transfers between different bank accounts. The problem is that the actors, i.e. the banks, are unaware of the money being transferred between the different bank accounts. The main reason for money laundering is to avoid taxes, which is the main characteristic of an illegal transaction, as mentioned in Chapter 3.

According to Eurostat (2018:72), money laundering is defined as a process of transferring money that is illegally obtained or investments that are obtained from illegal economic activities. Eurostat (2018:73) indicates that money laundering can be divided into different stages, but not all stages need to be followed. The first stage is to bring illicit funds into the formal financial system. The second stage is known as layering, which involves moving the funds illegally between banks from the true original status, and the last stage is to invest illicit funds further into criminal activities.

According to Business Intelligence (BI), the means by which the crime is committed cannot always been established. The SAPS crime statistics 2016/17 indicate that commercial crimes consist of cash crimes (9,1%), forged bank cards (5,1%), cellular phone fraud (4,6%), false information (18,3%), and false documentation (6,7%), and these are merely the main activities of commercial crimes.[92] Further commercial crimes indicated by the Financial Intelligence Centre (FIC) include 419 scams, pyramid scams, account hijacking, trade base money laundering, remittance schemes, Ponzi schemes, drug mules and cybercrime.[93]The SAPS see these type of crimes as part of commercial crimes.

According to an article by Budhram T. & Geldenhuys N. (2016:9), *"A losing battle? Assessing the detection rate of commercial crime*", commercial crime has increased dramatically since 2013, and losses from 2013 to 2016 in commercial crime amounted to R117 920 million. Statistics indicate that R29 270 million (2013/14), R62 570 million (2014/15) and R26 080 million (2015/16) were lost. The authors indicated that underreporting does exist with regard to commercial crime and recommended that more detailed statistics need to be published. As indicated in this report, the illegal services are not always measured correctly. This statement is supported by statistics released by the SAPS in the annual report of crime statistics that indicates the ***number of cases*** reported as being 85 646 (2011/2012), 85 570 (2012/13), 76 744 (2013/2014), 67 830 (2014/15) and 69 917 (2015/2016). The

[92] https://www.saps.gov.za/about/stratframework/annual_report/2016_2017/gpw_crime_stats_2017.pdf
[93] https://www.fic.gov.za/Documents/FIC_Typologies_report_FINAL.pdf

disadvantage of the published data by SAPS is that it does not indicate the value of commercial crime, but only indicates the number of cases. It is notable that the number of crimes had decreased over time, but that the value in commercial crime had increased; and specifically in the financial year 2014/15, there was a radical increase in the value of commercial crime.

The researcher has decided to use the average for the three years, based on article by Budhram T. & Nicolaas Geldenhuys to determine 2016; therefore, R39 306 million (R29 270 million (2013/14) plus R62 570 million (2014/15) plus R26 080 million (2015/16) divided by 3). The value added for the 2011 year for commercial crime is calculated backwards based on the growth rate of the number of cases. The assumption is that more commercial crimes are currently taking place, owing to the many new developments in technology, although it is notable in the above SAPS statistics that the number in crime cases had decreased since 2011.

The value of commercial crimes is seen as the output. It is more difficult to determine IC, as some IC does exist, for example bank costs, paying the middleman, etc. The assumption is made that 34,7% of output should be regarded as IC. This assumption is based on Statistics South Africa, Release P0441, *"Gross domestic product (GDP)"*, 64 x 105 table, which indicates that the informal, small-scale and NOE activities represent 34,7% of the output. The same base is use for 2016, but 35% of output represents IC for this period.

To determine the value added for 2011, the output of R39 179 million, minus R13 595 (IC) equals R25 584 million. To determine the value added for 2016, the output of R39 306 million minus R13 757 (IC) equals R25 549 million.

Table 6.35: Measuring value added for the illegal financial, intermediation, insurance, real estate and business services sector for 2011 and 2016 (R' million)

	2011	2016
Intermediate consumption	13 595	13 757
Value added	25 584	25 549
Total output at basic prices	39 179	39 306

It is notable that commercial crime increased only slightly between 2011 and 2016. This can be ascribed to the fact that more regulations have been put in place, such as the Financial Services Board (FSB). The SAPS is also more alert and prepared in crime prevention related to commercial crime. It

is also possible that the statistics of 2016 are totally underreported, especially when considering the recent media reports on corruption.

6.4.4 New estimations of the informal sector, own-account/self-employed and illegal activities for financial, intermediation, insurance, real estate and business services sector (SIC 8) for 2011 and 2016 (R' million)

This section reflects two datasets – one for the reference period 2011 and the other for the reference period 2016. Table 6.36 indicates the value of total output, intermediate consumption and the value added separately, and includes the total sector (SIC 8) illegal activities and informal sector.

Table 6.36: New estimates for SIC 8 informal sector, own-account/self-employed and illegal sector for 2011 and 2016 (R' million)

	2011	2016
Intermediate consumption	21 690	29 702
Value added	47 049	66 010
Total output at basic prices	68 739	95 712

It must be kept in mind that this table is not a true reflection of illegal activities, but the researcher has endeavoured to obtain figures closer to reality with these calculations. The values of some illegal activities are still unknown, e.g. bribery, corruption, swindling, etc. The following subsection (gap between existing and new estimations, and existing limitations) evaluates the existing data against the new estimates of the value added by informal, own-account businesses and illegal services.

6.4.5 Evaluation of published data against newly calculated estimates of the financial, intermediation, insurance, real estate and business services sector (SIC 8) for 2011 and 2016

The over-/underestimation is calculated by determining the difference between the newly estimations from the existing published data. The two reference periods, namely 2011 and 2016, are shown separately. Table 6.37 reflects the over-/underestimation.

Table 6.37: Total informal sector and illegal activities value added for the reference period 2011 (R' million)

	Total published formal, informal, NOE of SIC 8	New estimation of formal, informal, NOE SIC 8 sector	Over-/underestimation of SIC 8
Intermediate consumption	29 393	21 690	7 703
Total gross value added	24 409	47 049	-22 640
Total output at basic prices	53 802	68 739	-13 937

From the above table, it is clear that the value added for the period 2011 is underestimated by R22 640 million.

The same methodology is used to determine the 2016 year. To determine the over-/underestimation of the NOE sector for the calendar year 2016, the existing data by Statistics South Africa Release No. P0441 the second table of this section (table 6.32), column 3, is evaluated against the newly estimated financial, intermediation, insurance, real estate and business services sector informal sector, small-scale sector and illegal activities. Table 6.38 reflects calculations for the calendar year 2016.

Table 6.38: Total informal sector and illegal activities value added of SIC 8 reference period 2016 (R' million)

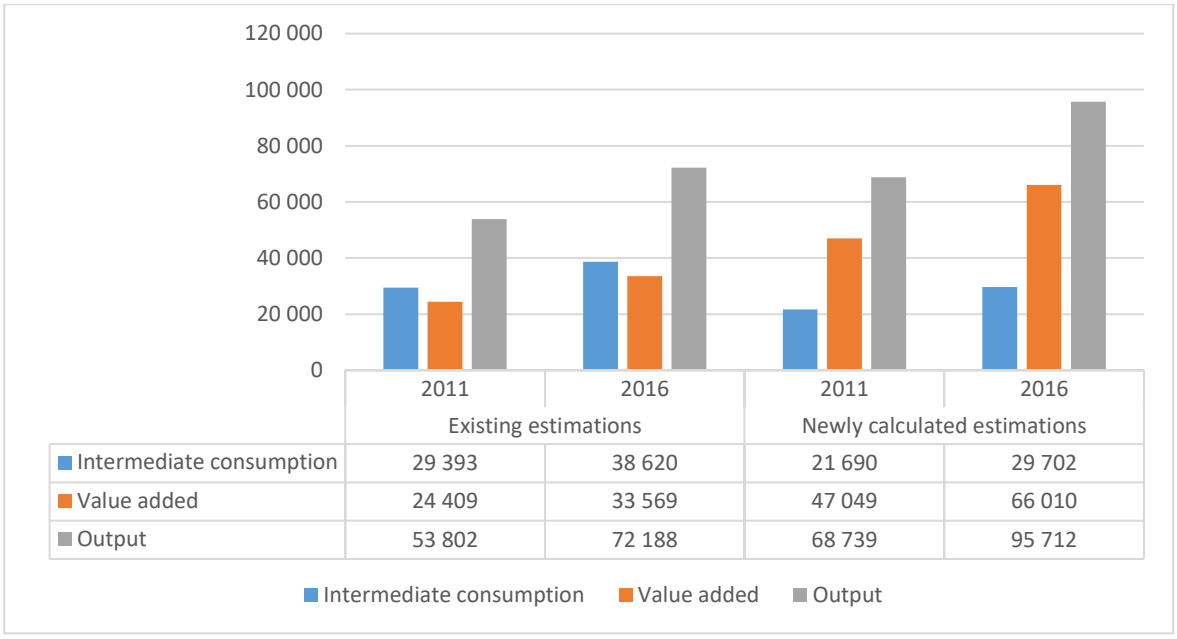
	Total published formal, informal, NOE activities	Current estimation of formal, informal, NOE activities	Over-/under-estimation of the of SIC 8
Intermediate consumption	38 620	29 702	8 900
Total gross value added	33 569	66 010	-32 411
Total output at basic prices	72 188	95 712	-23 524

From the above table, it is clear that the value added for the period 2016 is underestimated by R32 411 million for SIC 8; thus, it results in an underestimation of the total GDP. The results of both years indicate an underestimation of value added and output. These results are better conveyed as it is illustrated in a graph. The following section explains the reasons for the gap and the limitations.

6.4.6 Gap between existing published calculations and new estimations, and existing limitations

The graph below evaluates the published data and the new estimates for the informal sector, own-account businesses and the non-observed economy, and indicates over-/underestimation for this sector. The two reference periods, namely 2011 and 2016, are shown separately.

Graph 6.4: The gap between the newly NOE sector informal, own-account and illegal activities of SIC 8 compared to the newly calculated estimates of the informal, own-account and illegal activities of SIC 8 for the calendar years 2011 and 2016



	2011	2016	2011	2016
	Existing estimations		Newly calculated estimations	
Intermediate consumption	29 393	38 620	21 690	29 702
Value added	24 409	33 569	47 049	66 010
Output	53 802	72 188	68 739	95 712

The graph indicates a clear gap between the current estimates and the new estimates for 2011. The value added is underestimated by R22 640 million (R47 049 minus R24 409 million) and for 2016, the value added is underestimated by R23 524 million. The same result is obtained for output, where an underestimation is also present, while the IC is overestimated for both years.

When the above gap is taken into consideration, some limitations do exist, such as the lack of specific crime statistics by the SAPS (the exact value is also not mentioned, only the number of cases that are reported). Thus, if cases are not reported, these cases are not estimated under new illegal NOE activities. The lack of research on specific crimes makes it difficult for the researcher to estimate the exact extent of underestimation.

6.4.7 Concluding remarks with regard to the financial intermediation, insurance and real estate sector

Notwithstanding all the limitations in the data and assumptions that are made, the research question with regard to the size of the informal sector and illegal activities for SIC 8, the financial, intermediation, insurance, real estate and business services sector has been addressed, and the finding is that for the periods 2011 and 2016 value added, IC and output are underestimated; this indicates that the SIC 8 sector is underestimated. The newly estimates are in line with international guidelines, and national accounts can use these as a base to determine the informal, illegal and NOE activities. It is concluded that the objective of this sector was met as indicated in Chapter 1.

In this sector the international guidelines are followed to measure each sector. The final conclusion is discussed where all the sectors are added together and evaluated against the P0441 to determine the exact size of under-/overestimation. The advantage is that this methodology to calculate the size of informal and illegal financial, intermediation, insurance, real estate and business services sectors sector is usable for national accounts.

The following section discusses the “other” services (SIC 01) sector in respect of informal, own-account/self-employed and illegal activities. This section is more difficult to determine as non-profit institutions are included but the exact size of the NPI is unknown.

6.5 OVER OR UNDERESTIMATION OF THE COMMUNITY, SOCIAL AND PERSONAL SERVICES (SIC 9) AND PRIVATE HOUSEHOLDS AS EMPLOYERS AND UNDIFFERENTIATED PRODUCTION ACTIVITIES OF PRIVATE HOUSEHOLDS SECTOR (SIC 01)

6.5.1 Introduction

In terms of the research problem formulated for the purposes of this study and the conceptual framework shown above, the question to answer is if the SIC 9 and SIC 01 sector total size is accounted for in the GDP. Was this sector over- or underestimated taking all parameters into consideration, such as the NOE sector. It should be noted that SIC 9 includes the SIC 01 sector as well. SIC 9 is one of the biggest sectors as this includes all government departments and other household services. Government departments represent 19,3% of the total value added in 2011 and the rest (other services) of SIC 9 represents 0.3% of the value added. In 2016, government departments represented 20,6% whereas the rest of the SIC 9 and SIC 01 sector represented 0,4% of the value added.

6.5.2 Current estimation of value added in statistical release published by Stats SA

In order to determine the current size of the SIC 9 and SIC 01 sector, the SIC is taken into account. According to the Standard Industrial Classification (SIC), this sector includes public administration such as social security and defence activities, education services and other training, health and social worker such as medical and dental practices, veterinary activities, other community, social and personal services, activities of membership and organisation, recreation and cultural and sport activities, library, archives, museums and other cultural activities, and other services activities. Furthermore, the major division 0 is added to SIC 9. The major division includes private household's employees, extraordinary organisations, representative and foreign organisations, not economically active people, beggars, people living from handouts, charity, unemployed people, and people seeking work, non-profit institutions serving households etc. To determine this sector, the following formula is taken into consideration:

SIC 9 and SIC 01 = Community, social and personal services (SIC 9) and private households as employers and undifferentiated production activities or households (SIC 01) (Formal community, social and personal services and private households as employers and undifferentiated production activities or households sector + small-scale community, social and personal services and private

households as employers and undifferentiated production activities or households sector + illegal community, social and personal services and private households as employers and undifferentiated production activities or households sector sector)

When considering the size of the SIC 9 and SIC 01 sector according to the above equation, the existing estimates for the SIC 9 and SIC 01 sector are obtained from two statistical releases. The difference between the two tables is firstly, that the 10 x 10 use table is merely a condensed version of the 64 x 105 use table. Secondly, the 10 x 10 use table includes the informal sector, small-scale manufacturing sector and illegal activities ***as part*** of the manufacturing sector, whereas the 64 x 105 use table shows the informal sector, small-scale manufacturing sector and illegal activities of all the sectors as ***one column*** in the statistical release. The assumption is made that the difference between the two tables by sector represents the informal sector, own accounts sector and illegal activities.

Before determining the estimates of the 2011 calendar year, the 64 x 105 use table needs to be condensed to reflect a 10 x 10 use table as well. This allows the researcher to determine the difference between the two tables, the 10 x 10 and 64 x 105, and therefore, to calculate informal SIC9 And SIC 01 sector, small-scale SIC 9 and SIC 01 sector and illegal SIC 9 and SIC 01 activities separately for each sector. A problem exists when comparing the two tables, 10 x 10 use table (published 2016) and – after condensing – the 64 x 105 use table (published 2014) to a 10 x 10 use table. It is notable that the two tables differ in IC, value added and output. The reason for this is that the 10 x 10 use table was revised in 2016, although it is not mentioned which sector was revised. To accommodate for this revision of the 10 x 10 use table (2016) intermediate consumption, value added and output, the 64 x 105 use table (2014) is revised and compressed to a 10 x 10 use table. The assumption is made that the revision is added to the informal SIC 9 and SIC 01 sector, illegal SIC 9 and SIC 01 sector and own account SIC 9 and SIC 01 sector.

The second step is to determine the difference between the tables. This represents the informal SIC 9 and SIC 01 sector, the illegal SIC 9 and SIC 01 sector, and the own-account SIC 9 and SIC 01sector. This difference being that the revised 10 x 10 use table published P0441 GDP 1st quarter (2016) value added is R612 724 million, whereas the 64 x 105 use table, when condensed to a 10 x 10 table, value added is R541 567 million, which then is equal to a revised amount of R71 157 million. This amount reflects the current estimations for the 2011 informal SIC 9 and SIC 01 sector, the illegal SIC 9 and SIC 01 sector, and the own-account S sector.

Table 6.39: Informal SIC 9 and SIC 01 sector, illegal sector and own account sector for 2011 year (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Supply and use table 64 x 105 published P0441 GDP 4th quarter 2014	Difference between two tables reflects the revision portion of NOE sector allocated to SIC 9 and SIC 01 sector
Intermediate consumption	362 073	341 943	20 130
Total gross value added	612 724	541 567	71 157
Total output at basic prices	974 797	883 511	91 286

Source: Statistics South Africa (release No. P0441, 4th quarter 2014)

Table 6.39 measures the IC, value added and output after revisions in 2016 affected the 10 x 10 use table. This is seen as the published informal, small and illegal activities allocated to SIC 9 and SIC 01 sector. These current estimates are seen as a true reflection and is not analysed further.

The following section determines 2016 informal, small and NOE activities of IC, value added and output. The release by Statistics South Africa is taken into account, Release No. P0441, "*Gross domestic product (GDP) 4th quarter 2017*", Annual, quarterly and regional fourth quarter 2017.xls tables are used, worksheet "SUT 2016"; this represents a 10 x 10 use table and worksheet "use table 2016 (64_105)" that represents the larger use table. The 2016 data is not revised; thus, the two releases are used as is. The 64 x 105 use table is just condensed to a 10 x 10 use table. The differences between the two 10 x 10 use tables are used to determine the portion that is allocated to the informal, small and NOE activities sector.

Table 6.40: SIC 9 and SIC 01 informal sector, small-scale sector and NOE activities for 2016 year (R' million)

	Revised 10 x 10 supply and use table 10 x 10 published P0441 GDP 1st quarter 2016	Supply and use table 64 x 105 published P0441 GDP 4th quarter 2014	Difference between two tables reflects the revision portion of NOE sector allocated to SIC 9 and SIC 01 sector
Intermediate consumption	551 411	520 176	31 235
Total gross value added	907 805	815 848	91 957
Total output at basic prices	1 459 216	1 336 024	123 192

Source: Statistics South Africa (release No. P0441, 4th quarter 2017)

Table 6.40 represents the 2016 data that is allocated to the informal sector, small-scale sector and illegal activities. This current informal, small and NOE activities sector represent R31 235 million (IC), R91 957 million (value added) and R123 192 million (output). This data is not re-calculated, and the reasons are mentioned in the conclusion.

6.5.3 Measuring the community, social and personal services, private households and undifferentiated production of private households sector

Determining the informal sector of the community, social and personal services, private households and undifferentiated production of private households' sector, the definition of the *Quarterly labour force survey (QLFS)* (release No. P0211) is used where the informal sector refers to "persons working in private households who are not entitled to basic benefits such as pension or medical aid". Using this definition as a basis to determine SIC 9 and SIC 01, two statistical releases are used namely the *Quarterly labour force survey (QLFS)* (release No. P0211) and the *Quarterly employment statistics (QES)* (release No. P0277).

To determine the output of self-employed owners, the number of self-employed owners - 1118 000 (QLFS 2011:15) and 1299 000 (QLFS 2016:2) for 2011 and 2016 respectively - is multiplied by the salaries earned. Salary data is obtained from the Statistics South Africa release, *Quarterly employment statistics* (release No. P0277). According to the remuneration data (for 2011 and 2016) published in this release, the average earnings per month are R15 412 (2011) and R22 177 (2016). This is multiplied by 12 to obtain yearly earnings and divided by R million to obtain data in rand millions, which amount to R206 767 million per annum for 2011 and R345 695 million per annum for 2016.

To determine intermediate consumption (IC), the percentage contribution towards output is used. In Table 6.39 (2011), IC contributed 22 percent towards output and in 2016 (table 6.40) 25 percent. Value added is determined by output minus IC.

Table 6.41: SIC 9 and SIC 01 informal sector/self-employed by private households for 2011 and 2016 (R' million)

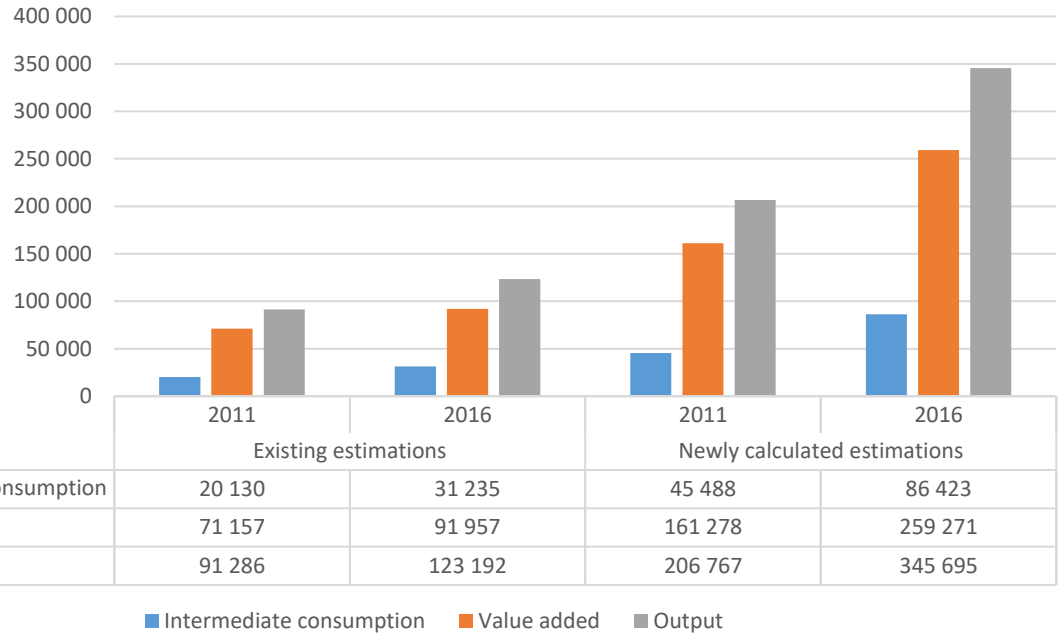
	2011	2016
Intermediate consumption	45 488	86 423
Value added	161 278	259 271
Total output at basic prices	206 767	345 695

Table 6.41 measures the IC, value added and output are underestimated. The total value added for 2011 and 2016 is R161 278 million and R259 271 respectively, this has a significant impact on the GDP underestimation.

6.5.4 Gap between existing published calculations and new estimations, and existing limitations

The graph below evaluates the published data and the new estimates for the self-employed for SIC 9 and indicates over-/underestimation for this sector. The two reference periods, namely 2011 and 2016, are shown separately.

Graph 6.5: The gap between the newly NOE sector informal, own-account and illegal activities of SIC 9 compared to the newly calculated estimates of the informal, own-account and illegal activities of SIC 9 for the calendar years 2011 and 2016



	2011	2016	2011	2016
	Existing estimations		Newly calculated estimations	
Intermediate consumption	20 130	31 235	45 488	86 423
Value added	71 157	91 957	161 278	259 271
Output	91 286	123 192	206 767	345 695

The graph indicates a clear gap between the current estimates and the new estimates for 2011. The value added for 2011 is underestimated by R90 121 million (R206 767 minus R45 488 million) and for 2016, the value added is underestimated by R259 271 million. Output and intermediate consumption are also underestimated for 2011 and 2016 respectively.

6.5.5 Concluding remarks with regards to SIC 9 and SIC 01

With the limited data available, it is clear that this informal sector is totally underestimated. Some constraints experienced are firstly, the non-profit institutions (NPI's) serving households are not included in new estimates whereas in the existing estimates NPI's are included. The researcher found it difficult to estimate NPI's impact on households, and therefore decided to omit the NPI for further research. Secondly, the researcher was able to measure a small portion of the domestic services, but still, a large portion is not declared by households such as gardeners, salons at home, cleaning services, informal pre-school teaching, home teachers/home schooling, external supervisors of universities, etc. who all receive remuneration but do not declare it. Thirdly, a further huge contribution is the needy people who receive SASSA, which also has an impact on the economic growth of a country, as they receive an income and spend it in the country. This impact on the economy is difficult to measure - although the grants can be determined, those grants that are obtained illegally are difficult to measure. Another reason is that not all household businesses declare their type of business and its turnover. Lastly, it is unknown if private education is included in this sector, or if only the government sector is included. To conclude, the objectives of the study was to base the research on international guidelines such as Eurostat (2018), OECD (2002), 1193 SNA, and 2008 SNA and these guideline gave little direction or methodology on how to determine the size of these sectors.

The total tertiary sector is underestimated, and the final results are explained in Chapter 7. Considering the above constraints, the researcher met the main objective of this thesis: to "determine the size of informal sector, small-scale/own account and illegal activities by sector", even though the researcher found that this sector would not be able to be measured comprehensively. The researcher took the decision that this sector needed further analysis and could be seen as a research topic on its own.

6.5.6 Concluding remarks for the tertiary sector

The total tertiary sector is underestimated and the final results are explained in chapter 7. Considering the above constrains the researcher meet the main objective of this thesis: to "determine the size of informal sector, small-scale/own account and illegal activities by sector", the researcher felt that this sector would not be able to be measured comprehensively. The researcher

took the decision that this sector needed further analysis and could be seen as a research topic on its own.

The following chapter, Chapter 7, discusses the findings of all sectors: agriculture (SIC 1), mining (SIC 2), manufacturing (SIC 3), electricity and water (SIC 4), construction (SIC 5), wholesale and retail trade (SIC 6), transport (SIC 7), business services (SIC 8) and other services (SIC 9 and SIC 01).

The overall result of the primary-, secondary-, and tertiary sectors are that all three sectors have been underestimated for 2011 and 2016 years. The result of underestimation has a direct impact on the estimation of South Africa's GDP. It must be taken into account, except for the direct and rand value underestimation in South African GDP, that there is also an indirect impact that this underestimation has. The indirect impact of the underestimation of the NOE activities is discussed in the closing paragraph in chapter 8.In the next chapter, the researcher determines exactly how much (in rand value) the South Africa economy was underestimated.

CHAPTER 7: DISCUSSION OF THE RESULTS

7.1 Introduction

The primary purpose of this study is to determine if the NOE is over-/underestimated. The previous chapters, Chapter 4 to Chapter 6, indicated the results of the underestimations with regard to the primary sector, secondary sector and tertiary sector. To determine the correct size of NOE activities' underestimations for national account purposes, the research must be in line with internationally prescribed national accountant guidelines, definitions and characteristics. If the research achieves these goals, the estimates can be used to supplement/implement the existing calculations of value added for South Africa.

To justify the purpose of the study, the researcher refers back to the research questions postulated in Chapter 1 under point 1.3 and each question is discussed separately for the primary sector, secondary sector and tertiary sector under 7.2 below.

7.2 Discussion of the results and answers to research questions

The discussion below refers to the research questions and gives answers to these questions. This is done by discussing the results and findings for the primary sector, secondary sector, the tertiary sector, followed by the total economy. The first question regarding the size of the sector is discussed separately under the relevant sector. Whereas questions 5 and 6 (point 1.3, Chapter 1) are discussed under the heading total sector. The reason for this is, because the answer is the same for all the sectors. It should be kept in mind that this discussion of the results only refers to the informal sector and illegal sector. The researcher assumes that the formal sector is covered by Statistics South Africa in Release No. P0441. Further, for clarity only, the negative in the table below means underestimation, whereas the positive means overestimation.

7.2.1 Primary sector

The first sector under discussion is the primary sector. The discussion follows the order of the research questions under point 1.3, Chapter 1.

1. The first question was whether the total size of the primary sector was taken into account when calculating the value added of this sector. To answer this question all data should be disaggregated to determine the size of underestimation. To obtain the size of underestimation the

primary sector takes the equations of the conceptual framework and methodology into consideration. According to Chapter 3, section 3.5.1, the agriculture sector consists of agriculture sector, forestry sector, fishing sector, and the mining sector (section 3.5.2) whereas the mining sector includes the mining sector and quarrying sector. It should be kept in mind that each one of these stated sectors comprises of the informal sector and illegal sector.

To determine the total value added for the primary sector's informal and illegal underestimation, the following equation is used:

$$\boldsymbol{Total\ primary\ sector\ informal\ and\ illegal\ activities} = \frac{\boldsymbol{dlAgric}}{\boldsymbol{dt}} + \frac{\boldsymbol{dNAgric}}{\boldsymbol{dt}} + \frac{\boldsymbol{dlMining}}{\boldsymbol{dt}} + \frac{\boldsymbol{dNMining}}{\boldsymbol{dt}}$$

Where:

dlAgric =Informal/small-scale agriculture sector;

dNAgric = illegal/grey/underground agriculture sector activities.

dlMining =Informal/small-scale mining sector;

dNMining= illegal/grey/underground mining sector activities.

dt = This indicates that the economy changes over time and that the economy is not stagnant.

The easiest way to answer question one is by using two tables. The two tables consist of the 2011 and the 2016 years respectively. Statistics South Africa's data and the researcher's data are indicated separately, to make the comparison between each other. The last column indicates the size of value added underestimation for the primary sector.

Table 7.1: Table findings of the primary sector value added underestimation for 2011 (R' million)

	Statistics South Africa	Researcher's findings	Underestimation
Intermediate consumption	3 176	1 682	1 494
Value added	106	26 318	-26 212
Output	3 282	28 000	-24 718

According to Statistics South Africa, the total value added of the primary sector for 2011 amounted to R106 million, whereas the researcher found the value added for the primary sector amounted to R26 318 million. This reflects a total underestimation of R26 212 million, with regard to the value added for the 2011 calendar year for the primary sector.

Table 7.2: Table findings of the primary sector value added underestimation for 2016 (R' million)

	Statistics South Africa	Researcher's findings	Underestimation
Intermediate consumption	91	2 410	-2 319
Value added	743	37 972	-37 229
Output	836	40 384	-39 548

According to Statistics South Africa the total value added of the primary sector for 2016 amounted to R743 million whereas the researcher found that the value added for the primary sector was underestimated with the amount of R37 229 million.

The reasons for the underestimation of the size of the primary sector between Statics South Africa and the Researcher may be the following:

- Statistics South Africa does not take into account the latest data, as data is based on a 5-yearly benchmarking exercise that was last done in 2014 based on 2010 data. The researcher has implemented the latest publications and methodology to arrive at estimates of underestimation. To provide some of the literature that were used to determine SIC 1 informal and illegal activities refer back to Chapter 4. The informal agriculture sector is derived from statistical releases of Statistics South Africa the *"Community Survey: Agriculture household*", Report No. 03-01-05:3, Release No. P0441 "*Gross domestic Product* ", SESE statistics and lastly a statistical release of DAFF (2017) "*Abstract of Agriculture survey*". The illegal agriculture sector is derived from media releases on illegal agriculture activities such as rhino poaching and the UN report on "*World Drug Report*" (2004). Informal mining sector is determined by using data from DME and an article of Howard et.al (2005). Illegal mining is obtained from DME data and news articles e.g. articles on "Zama Zama's". Informal fishery data is determined by several articles by different authors, one of which is an article by Isaac (2014) *"Backing small-scale fishers: Opportunities and challenges in transforming the fish sector"* (4.2.3.1) and furthermore a Statistics South Africa Release No. D1300. Illegal fishery data is obtained from an article by Schraader (2013) "*The impact of illegal fishing of South Africa's Economy*" (2013) and Gosling (2009) *"Illegal fishing costing SA billion*".
- It is unknown whether Statistics South Africa included the subsectors' informal and illegal activities when calculating the primary sector value added. In this case, the researcher had to include subsectors such as the agriculture sector, 4.2.1, mining sector, 4.2.2, and fishery, 4.2.3 to determine underestimation of the primary sector. The thesis does state that subsectors

are not calculated, and acknowledges that in some cases subsectors of the NOE sector were included, in particular in the case of the agriculture sector because the economic activity differs between the agriculture sector, forestry sector, fishery and mining sectors.

- A further reason is Statistics South Africa Release No P0441 does not separate the NOE, NPI and informal sector to determine the primary sector separately, whereas the researcher aims to estimate the NOE sector and informal sector separately in order to determine the size of value added underestimation for the primary sector. The researcher used two tables in the annual statistical Release P0441 to determine the NOE sector separately. The difference between the two tables is assumed by the researcher to be the NOE sector. (The difference between the two tables is explained in Chapter 4).

The researcher is of the opinion that all of the above methodology and publications can be implemented to calculate an improved value added of the South Africa economy. The next sector to be discussed is the secondary sector. Under this sector the second research question is answered as postulated in Chapter 1, point 1.3.

7.2.2 Secondary sector

The second sector under discussion is the secondary sector, which is covered in Chapter 5. The discussion follows the order of the research questions under point 1.3, Chapter 1.

1. The second research question was whether the total size of the secondary sector was taken into account when calculating the value added. To answer this question, all data should be disaggregated to determine the size of underestimation. To obtain the size of underestimation the secondary sector takes the equations of the conceptual framework and methodology into consideration. According to Chapter 3, the secondary sector includes the manufacturing sector (section 3.5.3), electricity, gas and water sector (section 3.5.4) and the construction sector (section 3.5.5). It should be kept in mind that each of these mentioned sectors comprise of the informal sector and illegal sector.

To determine the total value added for the secondary sector's informal sector and illegal sector the following equation is used:

$$\textbf{Total informal and illegal secondary sector} = \frac{dIManufact}{dt} + \frac{dNManufact}{dt} + \frac{dIElect\&water}{dt} + \frac{dNElect\&water}{dt} + \frac{dIContt}{dt} + \frac{dNContt}{dt}$$

Where:

dIManufact =Informal/small-scale manufacturing sector

dNManufact= illegal/grey/underground manufacturing sector activities

dIElect&water = Informal/small-scale electricity, gas, steam and hot water sector

dNElect&water = illegal/grey/underground electricity, gas, steam and hot water sector activities

dICont = Informal/small-scale construction sector

dNCont = illegal/grey/underground construction sector activities

dt = This indicates that the economy changes over time and that the economy is not stagnant

The easiest way to answer question two is by using a tables. The two tables consist of the 2011 and the 2016 years respectively. Statistics South Africa's data and the researcher's data are indicated separately to make the comparison between each other's informal sector and the illegal sector, while the formal sector is excluded. The last column indicates the underestimation and the size of value added underestimation.

Table 7.3: Table findings of the secondary sector value added underestimation for 2011 (R' million)

	Statistics South Africa	Researcher's findings	Underestimation
Intermediate consumption	42 216	75 631	-33 415
Value added	26 278	86 542	-60 264
Output	68 494	162 174	-93 680

According to Statistics South Africa, the total value added of the secondary sector for 2011 amounted to R26 278 million, whereas the researcher found that the value added for the secondary sector amounted to R86 542 million. This reflects a total underestimation of R60 264 million with regard to the value added of the secondary sector.

Table 7.4: Table findings of the secondary sector value added underestimation for 2016 (R' million)

	Statistics South Africa	Researcher's findings	Underestimation
Intermediate consumption	57 797	121 068	-63 271
Value added	39 195	130 010	-90 815
Output	96 992	251 079	-154 087

According to Statistics South Africa, the total value added of the secondary sector for 2016 amounted to R39 195 million, whereas the researcher found that the value added for the secondary sector was underestimated with the amount of R90 815 million.

The reasons why the size of the secondary sector was underestimated, are compared by looking at the methods used by Statistics South Africa and the researcher. These can be explained as follow:

- Statistics South Africa does not take into account the latest data, since data is based on a 5-yearly benchmarking exercise that was last done in 2014 based on 2010 data. The researcher on the other hand, has implemented the latest publications and methodology of Statistics South Africa to arrive at estimates of underestimation. To mention some of the new data the researcher implemented is e.g. the informal manufacturing sector – Statistical release No. P0221, Release No. P0277 and for small manufacturing business sector Statistical Release No P0276. For illegal manufacturing, several subsectors are discussed under 5.2.3.3. Some of the data that determined illegal manufacturing was SAPS data, DTI data, TISA (illegal tobacco) data, WHO (illegal alcohol), SAFACT and BSA (Illegal manufacturing of copies, audio and video material and usage of internet) and an article of Howell (2015) – illegal manufacturing of drugs, etc. were implemented. The informal and illegal electricity, gas, and water sectors are discussed under section 5.3 and data is obtained from Statistics South Africa Release No. P0318, Report 03-18-04, Report No. 3-18-04, a news article *"How much electricity is stolen in South Africa*", and an article by Hay (2012). Further, the informal and illegal construction (5.4.3) data is determined by using statistics South Africa data Release No. P0318 report No. 03-18-06. A shortcoming of the researcher's findings is with regard to the illegal activities of cable theft. Cable theft can be used for illegal connections of electricity or the resale of cables for copper.
- Secondly, Statistics South Africa did not include all subsectors of the NOE activities to estimate the size of the secondary sector. However, the thesis mentions that subsectors are not calculated, but the researcher included the subsectors of the electricity sector and water sector (section 5.3.3) with regard to informal and illegal activity. The reason for this decision was that the economic activity of the two sectors are completely different.
- Further, Statistics South Africa Release No P0441 does not separate the NOE, NPI and informal sector to determine the secondary sector separately, whereas the researcher aims to estimate the illegal sector and informal sector separately in order to determine the size of

value added for the secondary sector. The researcher used two tables in the annual statistical Release P0441 to determine the NOE sector separately. The difference between the two tables is assumed by the researcher to be the NOE sector. (The difference between the two tables is explained in Chapter 5).

7.2.3 Tertiary sector

The final economic sector under discussion is the tertiary sector, which is covered in Chapter 6. The discussion follows the order of the research questions under point 1.3, Chapter 1.

1. The third question was whether the total size of the tertiary sector was taken into account when calculating the value added. To answer this question, all data should be disaggregated to determine the size of underestimation. To obtain the size of underestimation the tertiary sector takes the equations of the conceptual framework and methodology into consideration. According to Chapter 3, the tertiary sector includes the wholesale and retail trade sector (section 3.5.6), transport, storage and communication sector (section 3.5.7), financial, intermediation, insurance, real estate and business sector (section 3.5.8), the community, social and personal services sector (section 3.5.9) and private households, exterritorial organisation, representatives of foreign government and other activities not adequately defined sector (section 3.5.10). It should be kept in mind that each of these mentioned sectors comprise of the informal sector and illegal sector.

To determine the total value added for the tertiary sector the following equation is used:

$$\boldsymbol{Total\ informal\ and\ illegal\ tertiary\ sector} = \frac{dIW\&R}{dt} + \frac{dNW\&R}{dt} + \frac{dITSC}{dt} + \frac{dNTSC}{dt} + \frac{dITSC}{dt} + \frac{dNTSC}{dt} + \frac{dICSP}{dt} + \frac{dNCSP}{dt} + \frac{dIPOther}{dt} + \frac{dNPOther}{dt}$$

Where:

dIW&R=Informal/small-scale wholesale and retail sector;

dNW&R= illegal/grey/underground wholesale and retail sector activities.

dITSC = Informal/small-scale transport, storage and communication sector;

dNTS C= illegal/grey/underground transport, storage and communication sector activities.

dIFIR = Informal/small-scale financial, intermediation, insurance, real estate and business services sector;

dNFIR = illegal/grey/underground financial, intermediation, insurance, real estate and business services sector activities.

dICSP = Informal/small-scale community, social and personal services sector;

dNCSP = illegal/grey/underground community, social and personal services sector activities.

dIPOther = Informal/small-scale private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector;

dNPOther = illegal/grey/underground private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector activities.

dt = This indicates that the economy changes over time and that the economy is not stagnant.

The easiest way to answer question three is by using two tables. The two tables consist of the 2011 and the 2016 years respectively. Statistics South Africa's data and the researcher's data are indicated separately to make the comparison between each other's informal sector and the illegal sector, while the formal sector is excluded. The last column indicates the underestimation and the size of value added underestimation.

Table 7.5: Table findings of the tertiary sector value added underestimation for 2011 (R' million)

	Statistics South Africa	Researcher's findings	Underestimation
Intermediate consumption	78 051	122 185	-44 134
Value added	192 213	331 036	-138 823
Output	270 262	453 223	-182 961

According to Statistics South Africa, the total value added of the tertiary sector for 2011 amounted to R192 213 million, whereas the researcher found that the value added for the tertiary sector amounted to R331 036 million. This reflects a total underestimation of R138 823 million with regard to the value added of the tertiary sector.

Table 7.6: Table findings of the tertiary sector value added underestimation for 2016 (R' million)

	Statistics South Africa	Researcher's findings	Underestimation
Intermediate consumption	113 032	202 817	-89 785
Value added	280 454	524 200	-243 746
Output	393 486	727 022	-333 536

According to Statistics South Africa, the total value added of the tertiary sector for 2016 amounted to R280 454 million, whereas the researcher found that the value added for the tertiary sector was underestimated with the amount of R 243 746 million. The reasons why the size of the tertiary sector

was underestimated, are compared by looking at the methods used by Statistics South Africa and the researcher. These can be explained as follow:

- One of the reasons why the researcher arrives at estimates of underestimation of the tertiary total value added, is because most of the latest publications and methodology are implemented by her, whereas Statistics South Africa partially implemented the latest publication. The researcher uses case studies of Eurostat (2018), news articles (e.g. WHO data analysis on South Africa regarding drugs, SAPS data with regard to stolen goods, etc.) and other authors' research to determine the size of the tertiary sector as closely as possible. A detailed discussion of these results was set out in Chapter 6.
- The researcher has implemented the latest statistics, such as BATSA's data to determine illegal tobacco usage; the Department of Transport's data to determine informal and illegal transport; and SAPS data to determine illegal trade. A complete analysis of the data from these sources is discussed in Chapter 6. Using the published data, the researcher was able to determine the informal and illegal sector as accurately as possible. Shortcomings in the researcher's findings exist because of data limitations. One of the sectors that was not discussed – whether it was formal or informal - was private education. The researcher did not include this in the thesis, and left it open for later research.
- The researcher includes the subsectors with regard to the trade sector, transport sector and accommodation sector. The reason for this decision is that the economic activity of these sectors is completely different.
- Further, Statistics South Africa Release No P0441 does not separate the NOE, NPI and informal sector to determine the tertiary sector separately, whereas the researcher aims to estimate the illegal sector and informal sector separately in order to determine the size of value added underestimation for the tertiary sector. The researcher used two tables in the annual statistical Release P0441 to determine the NOE sector separately. The difference between the two tables is assumed by the researcher to be the NOE sector. (The difference between the two tables is explained in Chapter 6).
- Lastly, although the specific methodology is not available for how the illegal tertiary sector was calculated, some case studies of Eurostat (2018) have been implemented and made applicable to South Africa. Some case studies that can be applied to South Africa circumstances are e.g. illegal trade, especially illegal drugs, smuggling, prostitution, copyright

etc. It should be kept in mind that these case studies can only be partially implemented in South Africa, because the case studies and methodology in use were based on developed countries and not on developing countries. It must be noted that there may still be shortcomings from the researcher's study. For South African purposes, the 2008 SNA, the OECD (2002) and the Eurostat (2018) documents can be implemented but is limited because of data constraints.

The following discussion contains the total sector (primary sector, secondary sector and tertiary sector) underestimation of value added.

7.2.4 Total economy sectors underestimation

The last discussion of the results refers to the total economy namely the primary sector, secondary sector and tertiary sector and how this underestimation affects the total South African economy and the impact on GDP estimates.

1. The fourth question was whether the total size of the economy was underestimated, when taking into account the informal sector and illegal sector. To answer this question all sectors (formal sector, informal sector and illegal economy sector) are considered. To assess the total underestimation of South Africa's economy, the equations of the conceptual framework and methodology are taken into consideration. According to Chapter 3, the total economy comprises of different sectors that are classified according to the Standard industrial classification (SIC). The economy consists of an agriculture sector (SIC 1), mining and quarrying sector (SIC 2), manufacturing sector (SIC 3), electricity, gas and water supply sector (SIC 4), construction sector (SIC 5), wholesale and retail trade sector (SIC 6), transport, storage and communication sector (SIC 7), financial intermediation, insurance, real estate and business services sector (SIC 8), community, social and personal services sector (SIC 9), private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector (SIC 01). To estimate the total economy the above sectors should include the formal sector, informal sector and the illegal sector. Please note that the above discussion (section 7.2.1 to section 7.2.3) under of the main sectors (primary sector, secondary sector, tertiary sector), exclude the formal sector.

The equation below indicates all the sectors in the economy (formal sector, informal sector and illegal sector). To determine the total value added for the economy, the following equation is used:

$$\frac{dfE}{dt} = \frac{dfA}{dt} + \frac{dfM}{dt} + \frac{dfMa}{dt} + \frac{dfEW}{dt} + \frac{dfCon}{dt} + \frac{dfWR}{dt} + + \frac{dfTC}{dt} + \frac{dfFin}{dt} + \frac{dFCSP}{dt} + \frac{dFPOther}{dt}$$

Where:

***dE** = total economy is equal to the following sectors:*

dfA = Agriculture sector

dfM = Mining and quarrying sector

dfMa = Manufacturing sector

dfEW = Electricity, gas and water supply sector

dfCon = Construction sector

dfWR =Wholesale and retail trade sector

dfTC = Transport, storage and communication sector

dfFin = Financial intermediation, insurance, real estate and business services sector

dfCSP = Community, social and personal services sector

dFPOther = Private households, exterritorial organisations, representatives of foreign government and other activities not adequately defined sector

dt = This indicates that the economy changes over time and that the economy is not stagnant.

The easiest way to explain the underestimation of the total economy is by using tables. The 2011 tables consist of two tables, firstly the current published data by Statistics South Africa (table 7.7), P0441 followed by the new estimates (table 7.8) of the value added by the researcher. The tables thereafter, table 7.10 and 7.11, discuss the 2016 calendar year underestimations. Keep in mind that this section includes the formal sector as it refers to the total economy.

7.2.4.1 Results indicating the 2011 underestimation

Table 7.7 takes the published data released by Statistics South Africa, No. P0441, and calculates the informal sector and the illegal sector separately. Calculating the informal sector and illegal sector separately allows the researcher to determine the size of underestimation with regard to the NOE activities of South Africa. The first table, table 7.7, indicates the current estimates published by Statistics South Africa. The three main sectors (primary sector, secondary sector and tertiary sector) are showed and the last column reflects the informal sector and illegal sector. The purpose of

indicating these sectors separately, is to determine the size of the underestimation with respect to the informal sector and the illegal sector.

Table 7.7: Table findings of the total economy value added as published by Statistics South Africa for 2011 (R' million)

Use table 2011	Total supply at purchasers' prices	Taxes less subsidies on products	Trade and transport margins		Primary sector	Secondary sector	Tertiary sector	Informal sector Illegal sector NPI's	Total industry	Total economy
Total uses (purchasers prices)	7 134 655				279 700	1465 102	1346 184	123 444	3 214 430	
Gross value added / GDP		299 259			330 574	526 797	1648 431	218 597	2 724 400	3 023 659
Total output at basic prices					610 274	1991 900	2 994 615	342 042	5 938 830	

Source: Statistics South Africa (release No. P0441, 4ther quarter 2017)

Table 7.7 reflects data as published by Statistics South Africa. The total value added as reflected in Table 7.7 amounted to R218 597 million. The total value added of the informal sector and illegal sector represents 8,0 percent towards the total industry. Table 7.8 below indicates the new calculations of the value added estimated by the researcher in this thesis.

Table 7.8: Table findings of the newly estimates of the total economy value added of South Africa for 2011 (R' million)

Use table 2011	Total supply at purchasers' prices	Taxes less subsidies on products	Trade and transport margins		Primary sector	Secondary sector	Tertiary sector	Informal sector Illegal sector NPI's	Total industry	Total economy
Total uses (purchasers prices)	7 134 655				279 700	1465 102	1346 184	199 498	3 290 484	
Gross value added / GDP		299 259			330 574	526 797	1648 431	443 894	2 949 697	3 248 956
Total output at basic prices					610 274	1991 900	2 994 615	643 397	6 240 186	

The newly value added estimated by the researcher shows that the total industry is underestimated by R225 297 million with regard to the informal sector, illegal sector and the NPI's. In this case the informal sector, illegal sector and NPI's represent 15,0 percent of the total economy. When comparing Table 7.7 and Table 7.8, it is notable that the total economy's value added of the NOE was

underestimated by 7,0 percent. This leads to an underestimation of the GDP. With this underestimation it should be kept in mind that the economy is further underestimated as many illegal activities are not included as discussed in the above sectors.

7.2.4.2 Results indicating the 2016 underestimation

Table 7.9 takes the published formal data released by Statistics South Africa, No. P0441, and calculates the informal sector and the illegal sector. Calculating the informal sector and illegal sector separately allows the researcher to determine the size of underestimation with regard to the value added of South Africa. Table 7.9 indicates the current estimates by Statistics South Africa whereas Table 7.10 indicates the newly estimates by the researcher. Both tables show the three main sectors (primary sector, secondary sector and tertiary sector), as well as the informal sector and illegal sector separately. The purpose of indicating these sectors separately is to determine the size of the underestimation with respect to the informal sector and the illegal sector. These estimates have an impact on the total size of underestimation for value added. This underestimations of the value added leads to an underestimation of the GDP of South Africa.

Table 7.9: Table findings of the total economy value added as published by Statistics South Africa for 2016 (R' million)

Use table 2016	Total supply at purchasers' prices	Taxes less subsidies on products	Trade and transport margins		Primary sector	Secondary sector	Tertiary sector	Informal sector Illegal sector NPI's	Total industry	Total economy
Total uses (purchasers prices)	10 210 458				406 604	1923 128	2050 574	170 920	4 551 226	
Gross value added / GDP		469 490			401 315	784 982	2374 132	320 393	3 880 823	4 350 314
Total output at basic prices					807 918	2708 111	4 424 707	491 314	8 432 050	

Source: Statistics South Africa (release No. P0441, 4ther quarter 2017)

The results in terms of Statistics South Africa (Table 7.9) is that the informal sector and illegal sector represents 8,3 percent towards the total economy. However, the finding reflected by the researcher in Table 7.10 indicates that the informal sector and illegal sector reflects 16,2 percent of the total economy. This indicates that the total economy of South Africa's informal sector and illegal sector is underestimated by 8,0 percent for 2016.

Table 7.10: Table findings of the newly estimates of the total economy value added of South Africa for 2016 (R' million)

Use table 2016	Total supply at purchasers' prices	Taxes less subsidies on products	Trade and transport margins		Primary sector	Secondary sector	Tertiary sector	Informal sector Illegal sector NPI's	Total industry	Total economy
Total uses (purchasers prices)	10 210 458				406 604	1923 128	2050 574	326 295	4 706 601	
Gross value added / GDP		469 490			401 315	784 982	2374 132	692 183	4 252 613	4 722 103
Total output at basic prices					807 918	2708 111	4 424 707	1 018 485	8 959 221	

It is clearly visible from the above table of 2016 that the GDP of South Africa is underestimated taking the GDP as measurement. If the 2011 and 2016 years are compared, it is prominent that the informal and illegal sectors grew over time, especially with regard to the secondary sector and the tertiary sector. If these two main sectors are further analysed in detail, a more complete picture of the underestimation of the total economy will be visible. It should be kept in mind that the researcher used only data readily available to her.

The fourth question is answered; and the conclusion is that all major sectors are underestimated and leads to the total economy value added underestimation. Detailed discussions of these sectors and subsectors are available in Chapters 4 to 6. The discussion above refers to all sectors therefore research question 1 to 4 as postulated in chapter I, point 1.3 is answered. Further, the fifth and sixth questions are answered under this section as the total sector includes the primary sector, secondary sector and tertiary sector.

The fifth question to answer was whether the international prescribed manuals were followed to calculate the value added of the informal and illegal sector activities. Reference of these manuals was mentioned early in the thesis namely Chapter 1, section 1.1. In the discussion of Statistics South Africa, it is clear that the 2008 SNA was partially implemented (Report No. D0904): only 6 out of the 44 changes from the 1993 SNA to the 2008 SNA was implemented. Further, no reference was made by Statistics South Africa to the OECD (2002) and the Eurostat (2018) documents. It is understandable that the Eurostat (2018) document has not yet been implemented, as it was recently published. It should be noted that the OECD international guideline, which specifically states how to measure the NOE, is in no way referenced in any national accountants estimates of the GDP Release No P0441 by Statistics South Africa. The underestimation could have been because the researcher has

implemented the 2008 SNA, the OECD (2002) and Eurostat (2018) international guideline as far as possible, especially with regard to trading in illegal products, but taking into account the data constraints. The researcher also tried to keep the methodology in line with the 2008 SNA to ensure that national accountants can use the data and implement/supplement the findings in the GDP estimates. The researcher is of the opinion that all prescribed international guidelines can be applied with regard to the informal and illegal economic activities to obtain a full estimate of the value added for the South Africa economy. Although the specific methodology is not available for how the illegal primary sector, secondary sector and tertiary sector is calculated, some case studies of Eurostat (2018) have been implemented and made applicable to South African circumstances. Case studies that were applied to South African circumstances included illegal trade, especially illegal drugs, smuggling, prostitution, copyright etc. These case studies can only be partially implemented in South Africa, because the case studies and methodology in use were based on developed countries and not on developing countries. It must be noted that there may still be shortcomings from the researcher's study. For South African purposes, the 2008 SNA, the OECD (2002) and the Eurostat (2018) documents can be implemented, but is limited because of data constraints.

The sixth question to answer was whether the correct definitions and characteristics were used to estimate the value added of the NOE economy activities for the total economic sector. In this case only the 2008 SNA (Chapter 2, section 2.2.2) was discuss as it superseded the 1993 SNA. According to paragraph 2.2.2.1, Statistics South Africa partially implemented changes of the 2008 SNA; although it is mentioned in all the statistical releases P0441, *"Gross domestic product (GDP)",* that all definitions and characteristics are implemented in the calculations of GDP estimates. It is assumed that the definitions and characteristics for calculating the formal sector are in line with the 2008 SNA, but it is uncertain whether the NOE sector also follows the 2008 SNA. The reason for the uncertainty is mentioned in Statistics South Africa report (D0904:8). It is uncertain how this amendment was made in subsequently GDP releases such as Release No P0441 as it is not described as part of the definitions. To answer this question on the part of the researcher, she refers to paragraph 2.3, Chapter 2, "Operationalising the NOE definition of the current study", where it is clearly indicated that the research is based on the 2008 SNA definitions and characteristics. This question is also answered in subsequent chapters where an explanation is given how to measure the value added of the tertiary sector. Further the OECD (2002) refers to the definitions and characteristics applicable to the informal sector and the illegal sector, which are guidelines followed by the researcher. The researcher believes

that the 2008 SNA definitions and characteristics can be fully implemented in South Africa to achieve a more complete estimate of the total value added for the total South Africa economy.

7.3 Implication of underestimation on the South Africa economy

The implications of underestimating the South Africa total economy value added is that the 2008 SNA is not fully implemented and leads to some miscalculations in the estimations of the South Africa economic indicators. In an article of Van de Ven (2014),"*New standards for compiling national accounts: what's the impact on GDP and other macro-economic indicators?*", he indicates some of the consequences that exist when the 2008 SNA is not implemented by national accountants. This section focuses on the implication underestimation of the value added will have on the South Africa economy.

By not implementing the 2008 SNA, as recommended in Chapter 2, it has misleading perceptions with regard to the size of the South Africa's value added. The misleading perceptions exist because non-market transactions are excluded from the value-added estimates. If non-market transactions such informal and illegal activities are not recorded, it leads to inaccurate monitoring by government, less income for government and the incorrect measurement of economic indicators e.g. real GDP per capita, income equality, influence the capital investment, Human Development Index (HDI), sustainability of natural resources, living standards (quality of life) etc.

Firstly, the indicator of a healthy economy is the real GDP per capita of a country. Real GDP is measured by a nation GDP divided by the population. In this case two questions arise, firstly is the GDP underestimated just because of excluding informal and illegal sector from the total economy or secondly, is the population size correctly measured. If the population size is wrongly measured, this average income per person in the country is wrongly measured. When GDP is wrongly measured it means the economy grows at a faster/slower pace. In this thesis where an underestimation of the total economy is established, it indicates that the economy grows at a faster pace, thus the income per person is higher.

A second implication of underestimation of the total economy leads to incorrect measurement of income equality. When a high share of a nation income is earned by a small group of households e.g. the top 20% earn 80% of the total income of a country, there is a high degree of income inequality;

thus, if the GDP is underestimated, this can lead to a wrong reflection of income inequality. With an underestimation of the total economy the income inequality is actually lower than actually measured.

Thirdly, underestimation of the total economy may have the perception that capital investment is low. However, even it if is an informal and illegal activity, it still needs advance technology, this could lead to higher capital investment. By underreporting of the total economy growth rate, it gives a misperception that capital investment is not needed, this leads to less international investments.

Fourthly, South Africa's growth can be connected to the Human Development index (HDI). The HDI refer to higher measure of a country's economic and social development, this includes measuring wealth, health and education. The implication of underreporting leads to a lower HDI, thus South Africa reflects lower social benefits, economic development, wealth and economic growth and this is not a true reflection.

A further implication of underestimation reflects a lower Genuine Progress Indicator (GPI). The GPI measures a country output (production of goods and services) and intermediate consumption (spending). When output and IC are wrongly measured, it reflects an underestimation of manufacturing and purchasing power in a country, thus lower demand and supply of products and services. This has an impact on international confidence and investment in South Africa.

Lastly, underestimation leads to wrong perceptions of South Africa's sustainability of natural resources. Wrong awareness of natural resources such as the mining sector and water sector, leads to less international financial investment.

Van de Ven (2015) also indicates that the GDP estimates should be based on the 2008 SNA and that all economic activities - whether bad or good - should be included in the calculations of the value added. Firstly, he indicates when measuring the growth rate, it should include non-market, legal and illegal, observed and non-observed activities. He refers back to the definitions and characteristics of the 2008 SNA and indicates that the most likely reason for not reporting all economic activities is because the informal and illegal sector tried to avoid paying taxes.

Secondly, Van de Ven indicates that the purpose of GDP is also to compare cross countries' growth rates and if GDP is based on a "narrow" view of production that only calculate formal activities, comparability between nations will not be possible. The argument of other country comparability is also true for growths over time, if some of the economic activities such as illegal and informal sector

are excluded from GDP estimates, it will result in a sudden GDP level shift without a corresponding change in activity e.g. changing in laws between countries such as informal production of alcohol, dagga production and illegal prostitution etc. The implication of underestimation of South Africa's total economy GDP leads that the economy estimates is not comparable to other countries. This is caused by the fact that that not all economic activities of the South Africa economy are including in GDP estimates and economic activities (informal sector and illegal sector).

Lastly, Van de Ven indicates that to exclude the monetary exchange between two "economic actors" based on illegality may leads to inconsistence and not the full implementation of the national account's framework (2008 SNA). Some examples are income caused by involving illegal activities such as drug trading that is not recorded, double booking constrains result in discrepancy between calculations of assets accumulation, misleading in saving rates for manufacturers. Further different treatment of informal and illegal activities makes it difficult to have consistency in international trade statistics e.g. where one country sees prostitution as legal, it is reflected as an export, but in the country where prostitution is illegal, it does not reflect as an import.

Taking the 2008 SNA, that forms the cornerstone of the national accounts framework, and the article of Van de Ven into consideration, the underestimation of the South Africa GDP leads to the following implications:

1. Not recording all economic activities within the boundaries of the South African economy, thus not complying fully to the 2008 SNA, it leads to non-complying to international prescribe guidelines to compile national accounts.

2. South Africa economy imports and exports are underestimated because of non-reporting of the informal and illegal sector - this statement supports Van de Ven's discussion.

3. The size of the total South Africa economy is underestimated, this leads to less investments, wrong measurements of inequality, it influences the capital investment, Human Development Index (HDI), sustainability of natural resources, and living standards (quality of life).

4. The true inflation rate is less than the measured inflation rate, overestimating the true rate of inflation implies that the interest rate is higher than the conventionally measured rate.

5. If the illegal and informal sector is not accurately measured, it leads to higher discrepancy between the GDP expenditure approach and the GDP production approach. The reason for this is

because household expenditure (determined from GDP expenditure approach) is correctly measured whereas the output and IC, obtained from GDP production approach, is incorrectly measured.

To conclude, the 2008 SNA tries to capture all economic activities within a country's boundary to ensure the size of the total economy is completely measured. By excluding some of the economic activities, such as informal and illegal, the total size of the South Africa value added remains underestimated and has an impact on a country's GDP calculations.

7.4 Concluding remarks with regard to the 2011 and 2016 underestimation

The concluding remarks discuss the three sectors - namely primary sector, secondary sector and the tertiary sector – separately; and provide a conclusive finding on the total economy over-/underestimation. The value added of the primary sector is underestimated by R26 212 million (2011) and R37 229 million (2016). The value added of the secondary sector is underestimated by R60264 million (2011) and R90 815 million and lastly, the value added of the tertiary sector is underestimated by R138 823 million and R243 746 million (2016). This leads to an underestimation of the total NOE value added of 7,03 percent for 2016. Certain differences can still exist because of assumptions made by the researcher. It should be kept in mind that neither Statistics South Africa's, nor the researcher's, estimates of the value added are precise, but both aimed to measure the value added that influenced the GDP estimates as close as possible.

The researcher is of the opinion that outstanding issues still remain, especially with regard to missing data, interpretation of certain methodologies, definitions and characteristics, which can lead to further underestimation of the value added of the total economy. Suggestions and recommendations of future research is discussed in Chapter 8.

CHAPTER 8: OVERVIEW, RECOMMENDATIONS AND CONCLUSIONS

8.1 Introductions

The principal objective of this research was to indicate if the value added of the NOE is fully measured, based on the 2008 SNA to ensure a more complete estimate of the South African economy in order for national accountants to implement/supplement these findings into current GDP estimates. Considering this objective, it is not possible if the correct size of each sector was not determined. Chapter 4 to Chapter 6 deliberated on all sectors such as the primary sector (agriculture sector, mining sector), secondary sector (manufacturing sector, electricity and water sector, construction sector) and tertiary sector (retail and wholesale trade sector, transport sector, business services and other services). This allowed the researcher to analyse the underestimation of value added and the size of each sector. The methodology, surveys used, analysis and limitations were discussed separately for each sector under its respective chapter. The results of this research reflected in Chapter 7, was that all sectors of the South Africa economy was underestimated with a total underestimation of 4,2 percent and 4,7 percent for 2011 and 2016 respectively.

The above research objective could not have been met if the prescribed international recommended guidelines, characteristics and definitions of the informal sector, small-scale and illegal/grey/ underground activities were not implemented and understood. Consequently, these were clarified in Chapter 2 of the dissertation. Chapter 2 discussed the definitions and characteristics pertaining to informal sector, small-scale and illegal/grey/underground activities, and how these have changed over time, in line with the need to be used by national accountants. In addition to the definitions and characteristics of the NOE activities, the research should be based on international guidelines such as the 2008 SNA, OECD (2002) and Eurostat (2018); these guidelines make it possible for national accountants to implement this research in the current calculations of the country's GDP. It also ensures that the sector size is more closely measured and illustrates which sector is underestimated when the NOE sector is taken into account.

The rest of this chapter focuses on the importance of the study, implications of the research, relation to previous research, limitations experience through the research by sector, and conclusion. It also provides an overall conclusion of the entire thesis.

8.2 Importance of the study

The advantage of this research is that it gives guidance to national accountants on which published surveys by Stats SA can be used to determine the value added of each sector and the value added of the NOE activities. This dissertation can be used by researchers as a base for further research to determine the impact that informal sector, small-scale and illegal/grey/ underground activities have on the total growth rate of South Africa. It allows policymakers to improve certain sectors with regard to employment and growth, and to improve business opportunities. This dissertation may be used by policymakers to decrease the levels of poverty and unemployment in certain sectors. It also allows government to make conclusive decisions regarding illegal activities, and whether some of these activities need to be legalised, such as prostitution. It enables government to detect the sectors that recorded the highest percentage of illegal activities, and to target those sectors to reduce underground activities that result in a lack of government income, such as the illegal trade in cigarettes.

When one considers the informal sector, small-scale and illegal/grey/underground activities, these definitely have an impact on the economic growth of South Africa, and they need to be calculated into the national accounts. The national accountants need to report each transaction pertaining to formal, informal, small-scale sector and illegal activities within the boundaries of SA. This thesis provides a guideline on how national accountants can include these transactions, but it should be noted that it will have an impact on the calculations supplied by national accounts pertaining to the growth rate.

8.3 Implications of the research

If one applies this research to the national accounts, the estimates of the growth rate of South Africa is underestimated. This is clearly demonstrated in Chapter 4 to Chapter 6, finding that the total economy value added has been underestimated. When one takes these results into consideration, the economy has grown faster than what was originally mentioned in the GDP release – especially among the illegal activities. It is generally accepted that the value added by formal activities is measured in detail, because it is based on annual financial statements, whereas the value added by informal sector, small-scale and illegal/grey/underground activities is underestimated.

8.4 Relation with earlier research

The findings are generally compatible with other research, e.g. research pertaining to the value added by the small-scale sector; however, in certain instances this dissertation does differ from other research, for example the analysis pertaining to illegal, informal activities and their value added. The following differences between this research and that of other current authors should be noted:

1. Other authors did not base their research on international guidelines such as the 2008 SNA, 1993 SNA, Eurostat (2018) and OECD (2002) to determine the value added of informal sector and illegal activities and, to some extent, also the small-scale sector. By not implementing these guidelines it is of no use for national accountants.

2. Not all characteristics, definitions and methodologies are followed as prescribed by international accounts guidelines; this leads to a gap in previous research as national accounts cannot implement former research, whereas this research takes these into consideration.

3. Other authors' research publications do not analyse the impact on the GDP of SA with regard to illegal activities and informal by sector; this research determines the impact of informal sector, small-scale sector and illegal activities on the growth rate of SA by sector.

4. Authors mostly concentrate on a certain geographical area to determine the size of the NOE sector. Specific geographical areas cannot always be inflated to represent the entire economy value added as rural and urban areas differ substantially.

5. Previous research is not based on national accounts and it creates a gap for national accountants to implement a finding on GDP.

Furthermore, although this researcher tries to implement all definitions, characteristics, and international guidelines some parts of the NOE are not covered comprehensively. The researcher is of the opinion that certain limitations do exist in this study; these are discussed under point 8.5.

8.5 Limitations of research

It should be stressed that this research has been mainly concerned with the fact that only a small number of studies that were based on the 2008 SNA have been undertaken. This causes a gap in

current literature, as national accounts cannot implement all results of previous authors in the calculations of GDP.

Secondly, the case studies mentioned in the Eurostat (2018) document are mostly based on European countries, which can create a problem in sub-Saharan countries because illegal activities are traditionally more prominent in African countries and can be higher in value than in European countries – especially corruption.

Thirdly, the results of this study are limited to those illegal activities that are mentioned in formal, published statistics and administrative data; thus, the likelihood does exist that not all illegal activities and informal sector activities are covered in this study. For instance, there is a lack of data on money laundering, corruption, state capturing, illegal gambling, etc.

Fourthly, data limitations exist and can been categorised in some point, namely unreliable data, data that is not valid, lack of quantity and quality of data and a low level of structural integrity of data.

- Data is not trustworthy due to incomplete reporting of all crimes by the SAPS. Data of the SAPS are limited e.g. rape statistics and stolen goods are documented only if victims of crime report it (Chapter 6), including alcohol-related crimes. A further example is dagga: most dagga sales are accounted for on the basis of seizures taken place, thus the derivative product. The indirect product sales such as the stem and the leaves which are also sold, are not included in the NOE calculation for illegal trade. In this research, SIC 8 illegal activities such as illegal gambling, smuggling, human trafficking, drugs, etc. are excluded because of unreliable and non-existence of data. This leads to underestimation of the South Africa economy value added.
- Secondly data provided by SAPS is not valid with regard to illegal activities e.g. related to dagga and alcohol. Although the act to plant dagga was recently legalised, the law is still not clear on the quantity that can be produced for own use, so it remains unclear on what is legal and what is illegal. The same goes for alcohol where production for own use is legal but the quantity that may be produced for own use is not clear.
- The quality of NOE data published by Statistics South Africa, especially on NOE activities, are lacking as it only releases data that is obtained from outside sources, such as crime statistics provided by the SAPS and VOCS. These reports do not include all crime activities e.g. crimes such as "*Victims of crime statistics",* Release no. P0341, "*Crime against women, Report No.*

03-40-05" and "*Crime statistics vol IV: Exploring the extent of and circumstances surrounding housebreaking/burglary and home robbery, Report No. 03-40-04*". Taking these statistics into consideration, it is clear that a large number of crime-related activities are excluded from this data and it leads to under estimation of value added in the economy.

- Furthermore, poor quality of data exists because of the wrong reporting of data, inaccurate processing and the methodology in use by Statistics South Africa. Some reasons are due to sample size as only businesses with a VAT turnover of over R2 million are included (P0044:35) in samples. This leaves room that NOE activities are excluded from total activities. Activities impacting on the quality of data are the weights that Statistics South Africa applies to represent the total population of businesses. If the NOE activities are excluded, does it really reflect all the business? As indicated in the statistical release *"Quarterly financial statistics (QFS)"*, No. P0044:33-34, by Statistics South Africa, human error also plays a role in the quality of data because of underreporting of data by businesses, collection and wrong capturing by employees and sample variability can all lead to inaccuracy of data.

- Data limitation also exists because of the low level of structural integrity. NOE data is normally not recorded, for example illegal activities by owners of a business that want to avoid taxes, e.g. having a double bookkeeping system, avoiding social responsibilities towards employees, and other reasons mentioned in Chapter 2 under point 2.5.
- Lastly, the researcher wishes to make it clear that the informal sector, small-scale sector and illegal activities were intentionally singled out for measurement, as it is generally accepted that the formal sector of the economy is measured in detail.

8.6 Future research recommendations

Determining the NOE sector leaves quite a lot of unanswered questions and leads to heaps of additional research opportunities. As this study refers to the over-/underestimation of these sectors, the recommendations for each sector differ, and are discussed below.

8.6.1 Recommendation SIC 1

Possible areas to explore for further research are hunting, poaching and small-scale farming. Hunting and poaching can be over-/underestimated as the exact input cost and IC are unknown. The loss of

revenue for government is unknown because large numbers of domestic hunting are not recorded since it is done on a cash basis; consequently, these transactions within the boundaries of SA are not recorded. According to the definition of a transaction, everything should be recorded where a transaction occurs between two persons. If such transactions are excluded, it leads to an undercount of the informal or illegal trade in SA.

Furthermore, a significant part of the agriculture sector is small-scale farming as this becomes a more prominent activity in SA, it should be analysed in more detail to ensure that income and expenditure is recorded nationally. It is recommended that more independent research is undertaken to obtain a comprehensive picture of the impact of small-scale farming on the economic growth of SA.

8.6.2 Recommendation SIC 2

Mostly, only news articles and limited research exist on illegal mining. It is recommended that, seeing that this is fast becoming a lucrative illegal activity owing to mines closing down, an in-depth analysis is needed of the impact that illegal mining has had on the loss of taxes, loss of employment opportunities and growth of the economy. To determine the impact of growth on the economy, it is recommended to do an analysis as to whether “zama zamas” spend the money within the boundaries of SA or whether the “zama zamas” spend the money outside the country. Furthermore, it should also be established who are involved in this illegal activity, and to determine the income (output) and expenditure (IC) of each person with regard to obtaining illegal gold and selling illegal gold. The reason for this is to avoid double counting, i.e. one person might sell the gold to the middleman, and the middleman sells it to the actual gold refinery, but there could be more people involved.

Secondly, research should be undertaken into the types of mines that are illegally mined, e.g. closed platinum mines or gold mines, and whether illegal miners actually only do it for cable theft and scrap metal. The quantity of the product that is illegally mined is also important, as this can lead to the reopening of mines, job creation and economic growth, and a decrease in illegal trade.

Thirdly, it can provide an opportunity for increasing informal small-scale mining, which could lead to higher employment and economic growth.

8.6.3 Recommendation SIC 3

As mentioned previously, this sector covers several subsectors. It is recommended that each subsector is analysed with regard to illegal activities and informal activities, e.g. illegal manufacturing of pharmaceutical products, dental prosthetics, illegal drugs, clothing, textiles, etc. Very little research has been done on the manufacturing sector, and this entire sector can be seen as a research topic in itself.

8.6.4 Recommendation SIC 4

It is important to discuss electricity (SIC 41) separately from water (SIC 42), as these two sectors have different formal suppliers. Electricity is generated by Eskom, whereas water supply is obtained from boreholes, dams and water boards.

Electricity (SIC 41) – Two sets of data need to be analysed to measure the illegal activities and informal sector comprehensively. Firstly, Eskom data is needed and secondly, data at municipal level must be obtained. Data from Eskom must consist of the generation of electricity and selling in value and per unit to municipalities and private consumers. Municipal data should be analysed by unit and Rand value purchased from Eskom, self-generated and selling to residents; this allows a comprehensive analysis on informal and illegal activities.

Furthermore, together with this analysis, it is suggested that the kw/h generated by using solar panels and generators is researched, because it can be seen as a loss to municipalities and Eskom as no income is generated. In line with this, is the impact of load shedding on the economy. This sector can be seen as a research topic on its own.

Water (SIC 42) – Two sets of data need to be analysed to measure the illegal activities an informal sector comprehensively. Firstly, water board data is needed and secondly, data at municipal level must be obtained. Data from water boards must consist of the selling of water in value and per unit to municipalities and the use of water by private consumers. Private consumers are seen as farmers who receive water independently from water boards, e.g. those who obtain water from boreholes and rivers. The reason for this is to determine the illegal activity and informal sector in respect of water usage.

In both sectors, pricing is important, because the price of water and electricity differs at municipal level, by sector and unit usage. It is important to analyse each municipality separately to have an actual figure on the impact of this on the economy.

8.6.5 Recommendation SIC 5

The researcher believes that more research is needed on illegal construction activities, especially regarding the erection of shacks and the illegal occupation of land. This data can assist government with policy reform and decision-making to reduce poverty by providing housing and land to the poor. Further illegal construction activities that need to be researched are the illegal extension of existing buildings.

This research does not cover all sectors of informal erection (e.g. people who hire informal workers from the street to build); however, these kinds of activities do have an impact on the growth rate of the economy.

8.6.6 Recommendation SIC 6

Lack of data makes it difficult to calculate all illegal activities in the wholesale and retail trade sector. Illegal trade includes human trafficking, smuggling, fencing of stolen goods, smuggling of alcohol and tobacco, cellular phones, drugs, etc. An in-depth analysis is necessary to calculate the value added and size of the total illegal trade sector. The number calculated for illegal activities in SIC 6 is just a small portion of this sector, and more research is needed as data and detailed crime statistics become available. The sub-sectors of this sector also need to be analysed individually.

Another informal activity where data is lacking concerns the accommodation sector, e.g. a holiday house that is rented out by the owner. The owner receives an amount for renting the house but does not declare it as part of their income. These illegal activities and informal sector activities are not measured in this research.

The researcher believes that this sector remains underestimated and all transactions are not recorded. Furthermore, this is a research topic on its own and can be analysed in greater detail per sub-sector.

8.6.7 Recommendation SIC 7

The researcher is of the opinion that illegal transportation is underestimated, because only illegal taxis are taken into account in Chapter 6, no other informal transport is taken into account such as Uber. Currently, lack of data makes it impossible to measure the size of the transport section in detail. Illegal activities such as the illegal registration of vehicles or illegal issuing of licences exist; however, these illegal activities are not always accounted for. To overcome this problem, all stolen vehicles should be recorded at police stations and should be reported as part of the SAPS crime statistics. Many people do not report their cars as stolen, because the vehicles were not insured.

Furthermore, informal transportation is not recorded. An example of informal transportation is someone paying for a lift when driving with a friend to work. The driver receives remuneration from the passengers who travel with him/her to cover fuel cost.

If one takes these activities of the NOE sector into consideration, it is evident that further research is necessary to cover the entire sector with regard to transportation. These activities can be addressed in the next census or in the transportation survey conducted by Statistics South Africa.

8.6.8 Recommendation SIC 8

This sector is the most underestimated of all, because the illegal activities are not measured in total. Some of the illegal activities that are not covered in this research are money laundering, bribes, illegal gambling, corruption etc. These activities are very difficult to measure, but they could end up being a huge contributor to this sector. It is recommended that further research is urgently done on this sector.

Another area that needs to be researched is imputed rent (SIC 84). Imputed rent is an economic theory that is applied to real estate. The easy way to explain imputed rent is that an owner can choose to rent out a house or live in it, the imputed rent is determined as if the house is being rented out and the value of renting should be determined as value added.

Currently it is not clear in the GDP "*Release No. P0441*" by Statistics South Africa if the private education and government education sectors are included. When considering the data, it seems as if only government education is included. Private education and its impact on the economy is a research topic on its own. This sector needs urgent, in-depth analyses

Taking all of the above into consideration, the researcher should mention that outstanding issues still remain especially with regard to SIC 8 where corruption, money laundering, illegal gambling (e.g. online gambling), and human trafficking are not even touched on. This leads to a need for further research in this sector. In SIC 9, private education is still an outstanding issue. Taking these factors into consideration, the tertiary sector is much more underestimated. This is further dealt with in Chapter 8, where recommendations for further research is suggested. Certain differences can still exist because of assumptions made by the researcher. It should be kept in mind that neither Statistics South Africa's, nor the researcher's, estimates of the value added are precise, but both tried to measure the value added that influence the GDP estimates as close as possible. The researcher found that the case studies and research could be applied in the South Africa environment regarding the informal sector and the illegal sector.

Taking the above into consideration, the researcher should mention that outstanding issues still remain in this research question. Some of the outstanding issues are illegal hunting, subsistence farming, illegal poaching e.g. bucks, etc. These outstanding issues are discussed in Chapter 8 where recommendations for further research are made. Certain differences can still exist because of assumptions made by the researcher. It should be kept in mind that neither Statistics South Africa's, nor the researcher's, estimates of the size of value added are precise, but both tried to measure the value added that influence the GDP estimates as close as possible.

8.6.9 Recommendation SIC 9

The majority of this sector is informal in nature, such as domestic workers, salons, catering and beauty treatments. These activities are not recorded and can make out a large contributor to this sector. The main reason for non-reporting is that it can be an in-kind remuneration between a family member and the owner of a business, or it can be a person who works for himself from home premises. The main reason why this sector is under-reported is that the workers do not pay tax, seeing that they are exempted from tax reporting if their earnings are less than R300 000 per annum.

The following section discusses other recommendations that are not mentioned above and are applicable to all the sectors.

8.6.10 Recommendations related to Chapter 7

The major shortcomings that the researcher encountered in her dissertation related to the secondary sector (SIC 6) and tertiary sector (SIC 8). SIC 6's value added is totally underestimated due to all illegal trade. Very little or no data is available regarding illegal trade in diamonds, gold, the exact value of copyright, and trading in stolen goods, such as stolen capital goods. SIC 8's value added is also severely underestimated because of corruption, money laundering, bribery, extortion and human trafficking in rand value; and is not estimated. These activities are excluded from the tertiary estimates. The reason for this is because data is limited or not available, and it is therefore impossible to estimate the size of value added underestimated correctly, because of these illegal activities. The likelihood does exist that the total informal and illegal activities is still largely underestimated. This leaves room for further research.

8.6.11 Other recommendations

Recommendations that are applicable to all sectors in the informal sector and illegal activities, are the following:

- Evaluate all sectors, SIC 1 to SIC 01, informal sector and illegal activities against other developing and developed countries in the world. This will allow the researcher to evaluate and compare illegal and informal activities between countries and countries of the same size and equivalent value added;
- Publish time series by Stats SA more frequently to ensure data can be updated more regularly. Publications should be in line with international guidelines such as 2008 SNA, OECD (2002) and the Eurostat (2018) documentation. This will allow national accountants to update illegal activities and informal sector activities on an annual basis and the growth rate can be determined more accurately. The researcher acknowledges the fact that surveys are a costly exercise, but even if a three-yearly survey is undertaken, it should be in line with national accountants' requirements.
- Detailed crime statistics allow national accountants to measure the illegal activities more comprehensively, in line with international statistics. Therefore, it is recommended that data from SARS and SAPS is published annually on illegal activities; in line with the requirements of national accounts.

8.7 Concluding remarks with regard to the limitations and future research

This chapter gives an overview of the dissertation with reference to the research questions and sub questions in Chapter 1. Furthermore, it identifies the relevance to previous literature and limitations that were experienced throughout the research and highlights the recommendations for future research. The research indicates that the size of informal sector and non-observed economy activities can be measured by sector in line with international guidelines and with the application of the 2008 SNA. This will ensure that national accountants use the methodologies described in each sector to supplement the current estimates of value added by economic activities in South Africa. Lastly, the researcher considers this thesis as a large contribution to the current GDP estimations by national accounts and recommends further research is necessary about each sector of the economy.

The following indicators mentioned in 1.1, chapter 1 is still unanswered: what is the indirect impact that the underestimation causes? In Chapter 1, the background, the study highlights the impact of underestimating the economy as follows:

Firstly, underestimation of the economy implies that the government cannot have accurate fiscal and monetary policies. Fiscal policy influences the taxes being paid by residents and therefore the income received by government; thus affecting GDP debt levels and government expenditure. The correct implementation of fiscal policy is crucial to the functioning and growth of an economy. The entire economy revolves around this and negative influences to GDP growth, such as the paying off of debt from international borrowing, are influenced by incorrect fiscal efficiency. The monetary policy influences the expansion/contraction business cycle by the South African Reserve Bank (SARB) as mandated by government to protect the value of the sovereign currency.

Another question that remains unanswered (based on the premise that the economy is underestimated), is whether the unemployment figure is really that high? If the NOE is correctly measured in the total economy, it could possibly indicate more employment in the NOE sector, thus more employment in South Africa. The correct measuring of the size of employment in a country indirectly implies higher consumer disposable income, a higher economic growth rate, less government borrowing, and the government can develop certain sectors in the economy to ensure further job creation. It is important for government to know in which sectors loss of revenue is the highest; by knowing this, government can target those sectors to reduce illegal activities and ensure higher employment and sector growth.

In conclusion, examining the indirect impact of NOE on the economy, the economic growth rate has indeed been underestimated. This leads to less international investment in South Africa and an underestimation of the relative size of the economy. This would have an overall negative impact on the South African economy as a whole.

8.8 Conclusion

The research question whether the total size of the South African economy had been underestimated, when considering the informal an illegal sector, was comprehensively addressed in this study. This is true for all the sectors, including the primary sector, secondary sector and tertiary sector. The total economy value added for 2011 was underestimated by 4,9 percent and for the 2016 year, by 4,6 percent. The researcher, as far as possible, followed international guidelines, definitions and characteristics in order to measure the informal sector and the illegal sector. This will allow national accountants an opportunity to supplement/implement this research in the current GDP estimates to obtain a more accurate growth rate of the South African economy.

BIBLIOGRAPHY

Barrett, J., (2003). Organizing in the Informal Economy: A Case Study of the Minibus Taxi Industry in South Africa. *International Labour Office.* [ISBN 92-2-113579-9].

Bilstein, M,(2010). South Africa Movie Piracy Challenges. *Intellectual Property Brief*. 1(1): 27-30.

Boutros-Ghali, B., Camdessus,. Delors, J., Paye, J., Peterson, L.T., (1993). System of National Accounts 1993. *Eurostat, IMF, OECD, organisation for Economic co-operation and development, UN.*

Boutros-Ghali, B., l Camdessus, M., Delors, J,. Paye, J,. Peterson, L, T,. (1993). System of national Accounts 1993. *Commission of the European Communities, IMF, OECD, UN and World Bank.*

Branch, G.M., Hauck, M., Siqwana-Ndulo, N., & Dye. A. H. (2010). Defining fishers in the South African context: South African*. Journal of Marine Science*. [2010:475-487].

Britz P, & Raemaekers S., 2016. Status of the South African Abalone Sector. South Africa: *Department of Ichthyology and Fishery Science Rhodes University & Department of Environmental and Geographic Science* (UCY).

Brooks-Gordon., Belinda and Mai, N. and Perry., Sanders. G. Sanders, T. (2015). Production, Income, and Expenditure in Commercial Sexual Activity as a measure of GDP in the UK National Accounts. *Birkbeck University of London*. [3 July, 2015:9-18].

Budhram, T., & Geldenhuys, N., (2017). A losing battle? Assessing the detection rate of commercial crime. *SA Crime Quarterly*. [September 2007:7-15].

Burger, F., Wright,G., & Nel L, (2007). National initiative to prevent and combat vehicle crime. *South Africa: Business against crime South Africa*. (July.98-111).

Chamber of Mines of South Africa. 2016. Facts and Figures, Johannesburg. *Chamber of Mines of South Africa*.

Coetzee, B., Horn, R,. (2006). The theft of precious metals from South African mines and refineries. *Institute of Security Studies for the Chamber of Mines of South Africa*. [August 2006].

Creamer M. 2018. Illegal mining worth R7bn a year. *PWC*. Available fromhttps://m.miningweekly.com/article/illegal-mining-worth-r7bn-a-year-pwc-2018-06-14. [Accessed 3 June 2018].

Consultation Paper (2015). Cost of Supply Framework for Licensed Electricity Distributors in South Africa. *The National Energy Regulator* [2015:1-27].

Damm, O,. & Triebel, R,. (2008). A Synthesis Report on Biomass Energy Consumption and availability in South Africa*. ProBec*. (February 2008:25-44).

Davies, R,. & Thurlow J,. (2009). Formal–Informal Economy Linkages and Unemployment in South Africa. *HSRC*. (March 2019:1-24).

De Greef, K,. &. Raemaekers,.(2014). South Africa's illicit abalone trade: An update overview and knowledge gap analysis. *USAID, TRAFFIC the Wildlife trade monitoring network, IUCN, Environmental evaluation unit*. [ISBN 978-1-85850-372-1].

Eurostat. (2018). Handbook on the compilation of statistics on illegal economic activities in national accounts and balance of payments. 2018 edition edition. *Eurostat.* ISBN 978-92-79-76448-6.

Fieldgate I., Jeffrey, R,. Madinane, M,. Ebrahim, Y,. Soobyah, L,. Jordaan, J,. (2013). Economic Impact of an advertising ban on alcoholic beverages for sector association for responsible alcohol use. *Econometrix (PTY) LTD* [March 2013:23-92].

Giovannini,E., Carson, C.S., Young, A.A., Korolev, M., (2002). Measuring the non-observed economy. A Handbook. OECD (2002).

Goga K., (2014). The illegal abalone trade in Western Cape. *Institute for Security studies* (ISS) [August 2014].

Greef, K,. (2013). The booming illegal abalone fishery in Hangberg: Tough lessons for small-scale fisheries governance in South Africa. *The University of Cape Town*. [February 2013:83-95].

Haas T., & Ferreira, S.M,. (2016). Combating Rhino Horn Trafficking: The Need to Disrupt Criminal Networks. *PLOS. [*Available from https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5117767/]]

Harms, L.T.C., (2018). A Casebook on the Enforcement of Intellectual Property Rights. *World Intellectual Property Organization* (*WIPO).* ISBN: 978-92-805-2982-1.

Hay, R,. Riemann, K,. van Zyl, G,. Tompson,. (2012). Ensuring water supply for all towns and villages in the Eastern Cape and Western Cape Provinces of South Africa. *Department of Water Affairs*. [2012:438-440].

Hill M., Barber, M,. Gotham, D,. (2018). Estimated costs of production and potential prices for the WHO Essential Medicines List. *British Medical Journal Global Health*. [December 2017].

Holtzkampf, E., (2015). Liquor consumption patterns in South Africa. *SAWIS*. (2014/2015:1-10).

Howell, S., Harker-Burnhams, N., Townsend, L., Shaw, M., (2015), The wrong type of decline: Fluctuation in price and value of illegal substances in Cape Town. *Centre of Criminology at the University of Cape Town.* [ISSN 1991-3877].

Isaacs, M., Hara, M., (2015). Backing small-scale fishers: Opportunities and challenges in Transforming the Fish sector. *Africa Institute for Africa Poverty, Land and agrarian Studies (Plaas).*

Irish, J,. (2005). Illicit trafficking of vehicles across Beit Bridge border post. *ISS Paper 109* [2005:1-10]

Ki-moon, B., Barroso, J.M,. Gurria, A,. Straus-Kahn, D,. Zoellick, R.B. (2009). System of national Accounts 2008. *IMF,OECD., UN, World Bank*. ISBN 978-92-1-161522-7.

Lloyd, P., (2014). Challenges in household energisation and the poor. *Journal of Energy of South Africa*. [2014:1-4]. Energy Institute, Cape Peninsula University of Technology Online. [1 May 2014].

Matzopoulos, R.G., *Truen, S., Bowman, B., Corrigall*, J., (2014). The cost of harmful alcohol use in South Africa. *SAMJ: South African Medical Journal*.

Meier, G,. & Rauch, J., (2000). Leading issues in economic development. Stanford University and University of California (7th edition pp. pp.18-30).

Minerals Council South Africa. (2016). Illegal mining is often organised and carried out by crime syndicates. *Anglo Gold Ashanti*. Available from https://www.mineralscouncil.org.za/work/illegal-mining. [Accessed 14 June 2018].

Moller, L,. Matic, S,. (2010). Best practice in estimating cost of alcohol. *WHO Regional Office for Europe*. [ISBN 978 92 890 4207 9].

Myburgh, V. (2016). An in-depth analysis of the trends shaping the entertainment and media sector in South Africa, Nigeria and Kenya. Entertainment and media outlook: 2016–2020. *PWC.* [7th annual (September 2016:1-59].

Peltzer, K., Ramlagan, S., Hohnson, B.D., Phaswana-Mafuya, N., (2010). Illicit Drug Use and Treatment in South Africa. *HSCR, University of the Free State, UCT*. [May 2011].

PRO-ACTIVE SA (2017) Victims of Vehicle Crime Survey 2017. Available from http://www.pro-activesa.co.za/Victims%20of%20Crime%20Simplified%20-%20March%202017.pdf [Accessed 4 March 2018].

Raemaekers, S., Hausk, M., Burgener, M., Mackenzie, A., Maharaj, G., Plaganyi E.E., Britz, P.J.. (2011). Review of the causes of the rise of the illegal South African abalone fishery and consequent closure of the rights-based fishery. *Ocean & Coastal management* [July 2011:433-445].

SAFACT. (2017). Working to thwart online piracy in South Africa. 2017. Available from: https://www.mediaupdate.co.za/media/127853/safact-working-to-thwart-online-piracy-in-south-africa [8 February 2018].

Seccombe, A. (2017). Sibanye suffers as illegal miners run rampant. Business Day Live. Available from: https://www.businesslive.co.za/bd/companies/mining/2017-06-29-sibanye-suffers-as-illegal-miners-run-rampant/
[Accessed 29 June 2018].

Stander, H., & Brink, J. (2016). Perspective on the future of personal transport in South Africa. South Africa. *AECOM* (Pty) Ltd, (October pp. 374).

Sonke G.. (2014). Sex Workers and Sex Work in South Africa*. OSFSA*. (December pp. 2-25)

Statistics South Africa (2006) Standard Industrial Classification of all Economic Activites. Statistics south Africa. ISBN 0-621-35094-X (June 2006).

Statistics South Africa. (2018). Quarterly Labour Force Survey (QLFS), 3rd Quarter 2018, Pretoria: Statistics South Africa.

Statistics South Africa. (2010). Survey of Employers and the Self-employed (SESE), 2009, Pretoria: Statistics South Africa.

Statistics South Africa. (2011). Census 2011: Agriculture household, Pretoria: Statistics South Africa.

Statistics South Africa. (2012). General Household Survey (GHS), 2011, Pretoria: Statistics South Africa.

Statistics South Africa. (2012). Implementation of the System of National Accounts 2008 in South Africa, Pretoria: Statistics South Africa.

Statistics South Africa. (2012). Quarterly Employment Statistics (QES), December 2011, Pretoria: Statistics South Africa.

Statistics South Africa. (2012). Quarterly Labour Force Survey (QLFS), 4th Quarter 2011, Pretoria: Statistics South Africa.

Statistics South Africa (2013). General Household Survey (GHS), 2012, Pretoria: Statistics South Africa.

Statistics South Africa. (2013). GHS series V Energy, 2002-2012, Pretoria: Statistics South Africa.

Statistics South Africa. (2013). GHS series V Energy, 2002-2012, Pretoria: Statistics South Africa.

Statistics South Africa. (2013). Mid-year population estimates, 2013, Pretoria: Statistics South Africa.

Statistics South Africa. (2013). Quarterly Employment Statistics (QES), December 2012, Pretoria: Statistics South Africa.

Statistics South Africa. (2013). Quarterly Labour Force Survey (QLFS), 4th Quarter 2012, Pretoria: Statistics South Africa.

Statistics South Africa. (2014). General Household Survey (GHS), 2013, Pretoria: Statistics South Africa.

Statistics South Africa. (2014). Gross Domestic Product (GDP), 4th Quarter 2013, Pretoria: Statistics South Africa.

Statistics South Africa. (2014). Mid-year population estimates, 2014, Pretoria: Statistics South Africa.

Statistics South Africa. (2014). Quarterly Employment Statistics (QES), December 2013, Pretoria: Statistics South Africa.

Statistics South Africa. (2014). Quarterly Labour Force Survey (QLFS), 4th Quarter 2013, Pretoria: Statistics South Africa.

Statistics South Africa. 2014. Survey of Employers and the Self-employed (SESE), 2013, Pretoria: Statistics South Africa.

Statistics South Africa. (2015). General Household Survey (GHS), 2014, Pretoria: Statistics South Africa.

Statistics South Africa. (2015). Mid-year population estimates 2015, Pretoria: Statistics South Africa.

Statistics South Africa. (2015). Quarterly Employment Statistics (QES), December 2014, Pretoria: Statistics South Africa.

Statistics South Africa. (2015). Quarterly Labour Force Survey (QLFS), 4th Quarter 2014, Pretoria: Statistics South Africa.

Statistics South Africa. (2015). Quarterly Labour Force Survey (QLFS), 4th Quarter 2014, Pretoria: Statistics South Africa.

Statistics South Africa. (2016). General Household Survey (GHS), 2015, Pretoria: Statistics South Africa.

Statistics South Africa. (2016). GHS series volume VII: Housing from a human settlement perspective (In-depth analysis of the General Household Survey: 2002-2014, Pretoria: Statistics South Africa.

Statistics South Africa. (2016). Mid-year population estimates, 2016, Pretoria: Statistics South Africa.

Statistics South Africa. (2016). Press statement GDP Historical: 2010 - 2015, Pretoria: Statistics South Africa.

Statistics South Africa. (2016). Quarterly Employment Statistics (QES), December 2015, Pretoria: Statistics South Africa.

Statistics South Africa. (2016). Quarterly Labour Force Survey (QLFS), 4th Quarter 2015, Pretoria: Statistics South Africa.

Statistics South Africa. (2016). GHS series vol VIII: Water and sanitation - In-depth analysis of the General Household Survey, 2002-2015 Report 03-18-07, *Pretoria: Statistics South Africa*.

Statistics South Africa. (2017). General Household Survey (GHS), 2016, Pretoria: Statistics South Africa.

Statistics South Africa. (2017). Gross Domestic Product (GDP), 4th Quarter 2016, Pretoria: Statistics South Africa.

Statistics South Africa. (2017). Quarterly Employment Statistics (QES), December 2016, Pretoria: Statistics South Africa.

Statistics South Africa. (2017). Quarterly Labour Force Survey (QLFS), 4th Quarter 2016, Pretoria: Statistics South Africa.

Statistics South Africa. (2018). General Household Survey (GHS), 2017, Pretoria: Statistics South Africa.

Statistics South Africa. (2018). Mid-year population estimates, 2018, Pretoria: Statistics South Africa.

Statistics South Africa. (2018). Quarterly Employment Statistics (QES), December 2017, Pretoria: Statistics South Africa.

BIBLIOGRAPHY

Statistics South Africa. (2018). Quarterly Labour Force Survey (QLFS), 4th Quarter 2017, Pretoria: Statistics South Africa.

Statistics South Africa. (2018). Victims of Crime Survey. [11 October].

Statistics South Africa. (2017). Mid-year population estimates, 2017, Pretoria: Statistics South Africa.

Stewart. P.F.. (2012). Labour time in South African gold mines: 1886-2006. *University of Witwatersrand*. (January 2012).

Tewari, D.D. (2012). Promoting non-timber forest products (NTFPs) to alleviate poverty and hunger in rural South Africa: A reflection on management and policy challenges. *University of Kwa-Zulu Natal*. [November. 6(47)].

Van de Ven P (2014),"New standards for compiling national accounts: what's the impact on GDP and other macro-economic indicators?. *OECD Statistical Brief.* [February 2015:2-15].